



European Network of  
Transmission System Operators  
for Electricity

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# NETWORK CODES CANONICAL EXTENSIONS SPECIFICATION

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ICTC APPROVED  
VERSION 2.3.1

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## Revision History

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1486

1487 **1 Introduction**

1488 This document describes CIM extensions that were designed for the purpose of network codes  
1489 related exchanges. The set of profiles which use these extensions could be applied for other  
1490 exchanges too. Therefore, the objective is to propose these extensions for appropriate  
1491 standardisation in IEC.

1492 The Coordinated Security Analysis data exchange specification by ENTSO-E shall be used as  
1493 a reference to understand the context, use cases and the terms and definitions considered while  
1494 designing the canonical extensions.

1495 This document is describing extensions to support:

- 1496 - proper modelling required for CSA process, long-term network and market simulations,
- 1497 - be more explicit about various DER types, and,
- 1498 - uniformly support energy allocation to any kind of energy resource.

1499 **2 Specification documents references**

1500 The following specification documents, in whole or in part, are referenced in this document and  
1501 are indispensable for its application. For dated references, only the edition cited applies. For  
1502 undated references, the latest edition of the referenced document (including any amendments)  
1503 applies.

- 1504 • ENTSO-E Regional Coordination Processes Data Exchange Specification;

1505 The class SimulationEvents is part of the IEC 61970-302:2024 and IEC 61970-457:2024 that is  
1506 not part of CGMES 3.0 but will be included in upcoming version of CGMES. For technical reason  
1507 this has not been tagged with the NC namespace because it is only referred to, not initiated.  
1508 SimulationSetting profile is part of the header and metadata document.

1509 **3 Network codes extensions**

1510 **3.1 General**

1511 This package contains the extensions defined for the need of Network codes (NC) data  
1512 exchanges.

1513 **3.2 ExtNetworkCodesCIMVersion root class**

1514 The version information assigned to the extensions defined for the need of network codes data  
1515 exchanges.

1516 Table 1 shows all attributes of ExtNetworkCodesCIMVersion.

1517 **Table 1 – Attributes of ExtNetworkCodes::ExtNetworkCodesCIMVersion**

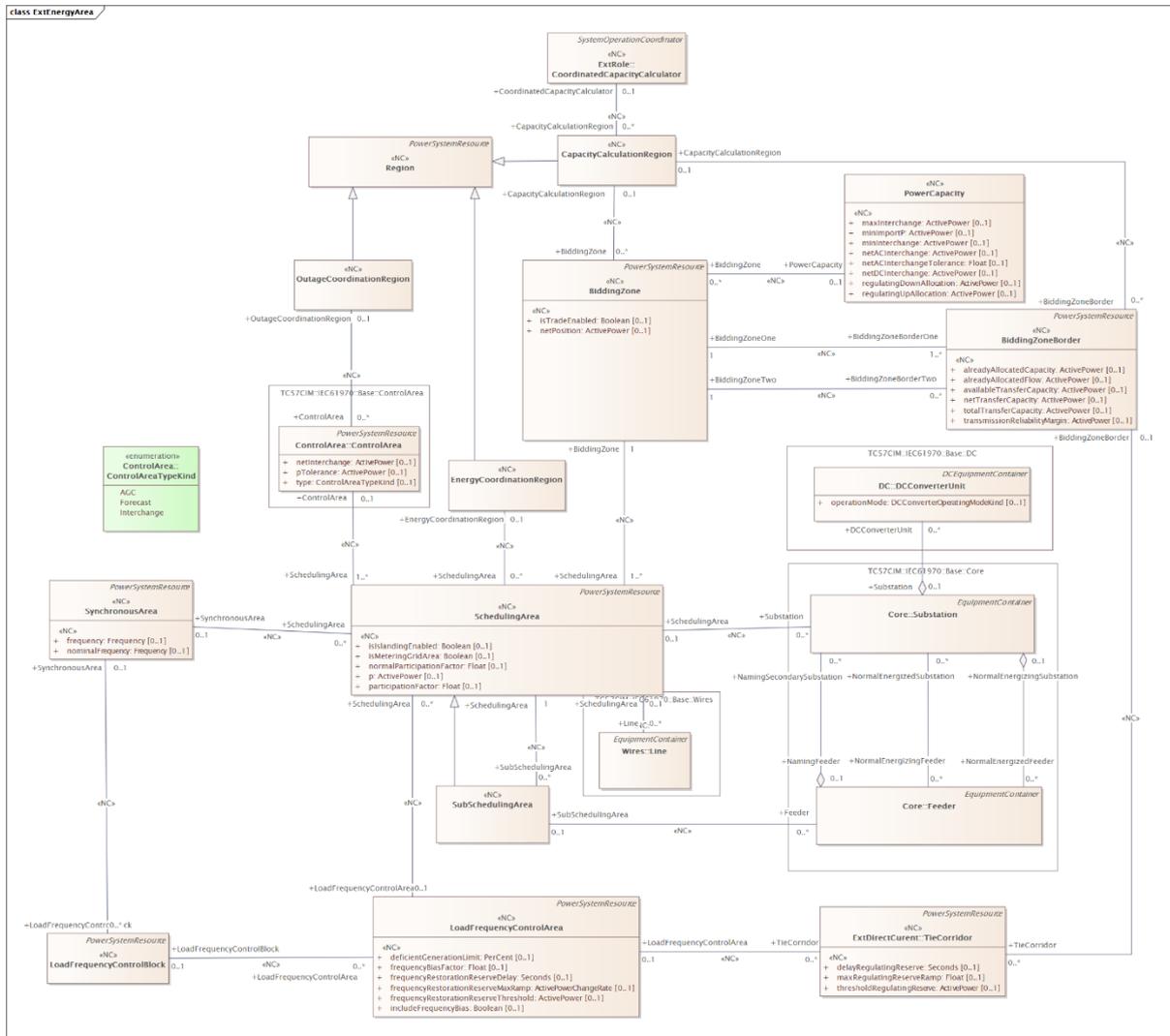
name	mult	type	description
date	0..1	Date	(const=2024-09-08) Date of the last canonical model update. Form is YYYY-MM-DD. For example, for 5 January 2009 it is 2009-01-05.
version	0..1	String	(const=2.3.1) European namespace URI. The last two elements in the URI (http://iec.ch/TC57/CIM100-EuropeanExtension/yy/zzz#) indicate major and minor versions where: - yy - indicates a major version; - zzz - indicates a minor version.

1518

1519 **3.3 Package ExtArea**

1520 **3.3.1 General**

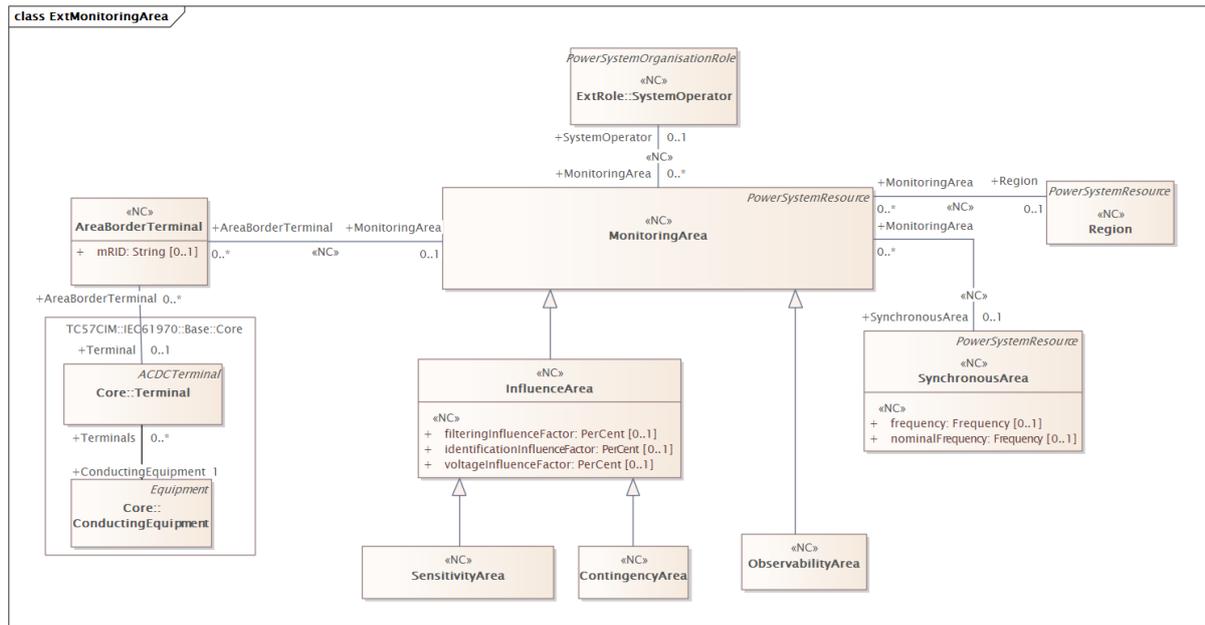
1521 This package contains the extensions related to the areas.



1522

1523 **Figure 1 – Class diagram ExtArea::ExtEnergyArea**

1524 Figure 1: The diagram contains classes related to energy area.



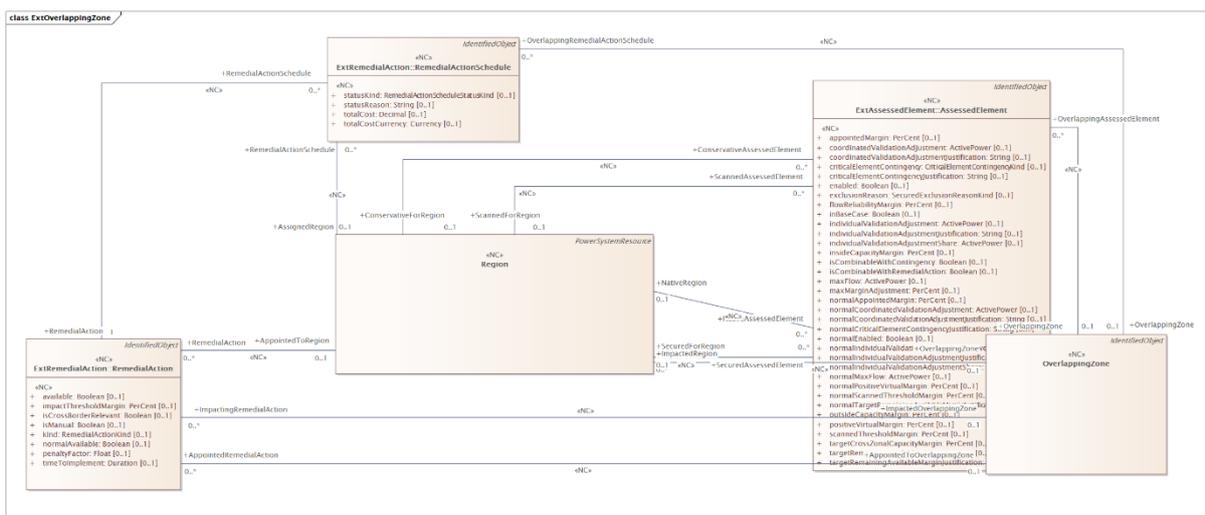
1525

1526

**Figure 2 – Class diagram ExtArea::ExtMonitoringArea**

1527

Figure 2: The diagram contains classes related to monitoring area.



1528

1529

**Figure 3 – Class diagram ExtArea::ExtOverlappingZone**

1530

Figure 3: The diagram contains classes related to overlapping zone.

1531

**3.3.2 (NC) OutageCoordinationRegion**

1532

Inheritance path = [Region](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1533

A region that has a common organisation or service responsible for outage planning and

1534

coordination and its impact on grid operation.

1535

Table 2 shows all attributes of OutageCoordinationRegion.

1536

**Table 2 – Attributes of ExtArea::OutageCoordinationRegion**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1537

1538

Table 3 shows all association ends of OutageCoordinationRegion with other classes.

1539

**Table 3 – Association ends of ExtArea::OutageCoordinationRegion with other classes**

mult from	name	mult to	type	description
0..1	ControlArea	0..*	ControlArea	(NC) The control area that is part of this outage coordination region.
0..1	OutagePlanningAgent	0..*	<a href="#">OutagePlanningAgent</a>	(NC) Agent responsible for planning availability in this outage coordination region.
0..*	SecurityCoordinator	0..1	<a href="#">SecurityCoordinator</a>	(NC) The security coordinator that is responsible for this outage coordination region.
0..*	OutageCoordinator	0..1	<a href="#">OutageCoordinator</a>	(NC) The outage coordinator responsible for this outage coordination region.
0..1	ConservativeAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">Region</a>
0..1	RemedialAction	0..*	<a href="#">RemedialAction</a>	(NC) inherited from: <a href="#">Region</a>
0..1	SecuredAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">Region</a>
0..1	RemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) inherited from: <a href="#">Region</a>
0..1	LimitViolation	0..*	<a href="#">PowerFlowResult</a>	(NC) inherited from: <a href="#">Region</a>
0..1	MonitoringArea	0..*	<a href="#">MonitoringArea</a>	(NC) inherited from: <a href="#">Region</a>
0..*	OverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">Region</a>
0..1	ScannedAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">Region</a>
0..1	NativeAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">Region</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1540

1541 **3.3.3 (NC) OverlappingZone**

1542 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

1543 A collection of all the overlapping cross border assessed elements which have the same sets of impacted and impacting regions.

1545 Table 4 shows all attributes of OverlappingZone.

1546 **Table 4 – Attributes of ExtArea::OverlappingZone**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1547

1548 Table 5 shows all association ends of OverlappingZone with other classes.

1549 **Table 5 – Association ends of ExtArea::OverlappingZone with other classes**

mult from	name	mult to	type	description
0..1	ImpactingRemedialAction	0..*	<a href="#">RemedialAction</a>	(NC) The remedial action that is impacting an overlapping zone.
0..1	AppointedRemedialAction	0..*	<a href="#">RemedialAction</a>	(NC) The appointed remedial action that is appointed to an overlapping zone.
0..1	OverlappingAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) The overlapping assessed element on which the physical flows are significantly impacted by electricity exchanges in two or more regions or by remedial actions from two or more regions.
0..1	OverlappingRemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) The remedial action schedule which is overlapping for this zone.
0..1	ImpactedRegion	0..*	<a href="#">Region</a>	(NC) The region that is impacted by this overlapping zone.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1550

1551 **3.3.4 (NC) Region**

1552 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1553 A region where the system operator belongs to.

1554 Table 6 shows all attributes of Region.

1555 **Table 6 – Attributes of ExtArea::Region**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1556

1557

Table 7 shows all association ends of Region with other classes.

1558

**Table 7 – Association ends of ExtArea::Region with other classes**

mult from	name	mult to	type	description
0..1	ConservativeAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) The assessed element which is considered conservative for this region.
0..1	RemedialAction	0..*	<a href="#">RemedialAction</a>	(NC) The remedial action which is considered in the region.
0..1	SecuredAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) The assessed element secured for this region.
0..1	RemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) The remedial action schedule relevant for this region.
0..1	LimitViolation	0..*	<a href="#">PowerFlowResult</a>	(NC) The limit violation reported by a region.
0..1	MonitoringArea	0..*	<a href="#">MonitoringArea</a>	(NC) Monitoring area which belongs to a region.
0..*	OverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) The overlapping zone which is impacted by this region.
0..1	ScannedAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) These are the scanned assessed elements for a region.
0..1	NativeAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) The native assessed element for a native region.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1559

1560

### 3.3.5 (NC) ScheduleResource

1561

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1562

A schedule resource is a market-based method for handling participation of small units, particularly located on the lower voltage level that is controlled by a Distributed System Operator (DSO). It is a collection of units that can operate in the market by providing bids, offers and a resulting committed operational schedule for the collection.

1563

1564

1565

1566

Table 8 shows all attributes of ScheduleResource.

1567

**Table 8 – Attributes of ExtArea::ScheduleResource**

name	mult	type	description
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.  In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ .  In the case of priority strategy, the item with the lowest number gets allocated energy first.
p	0..1	ActivePower	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1568

1569

Table 9 shows all association ends of ScheduleResource with other classes.

1570

**Table 9 – Association ends of ExtArea::ScheduleResource with other classes**

mult from	name	mult to	type	description
0..1	GeneratingUnit	0..*	GeneratingUnit	(NC) The generating unit that relates to this schedule resource.
0..1	HydroPump	0..*	HydroPump	(NC) The hydro pump that relates to this schedule resource.
0..1	PowerElectronicsUnit	0..*	PowerElectronicsUnit	(NC) The power electronics unit that relates to this schedule resource.
0..1	AreaDispatchableUnit	0..1	<a href="#">AreaDispatchableUnit</a>	(NC) The dispatchable unit for this scheduled resource.
0..*	SchedulingArea	0..1	<a href="#">SchedulingArea</a>	(NC) The scheduling area that has this schedule resource.
0..1	PowerSchedule	0..*	<a href="#">PowerSchedule</a>	(NC) Power schedule which belongs to the schedule resource.
0..*	ResourceOf	0..1	<a href="#">ScheduleResource</a>	(NC) The schedule resource that has this subschedule resource.
0..1	PowerShiftKeySchedule	0..*	<a href="#">PowerShiftKeySchedule</a>	(NC) The Power Shift Key schedule for a schedule resource.
0..1	RedispatchAction	0..*	<a href="#">RedispatchScheduleAction</a>	(NC) The redispatch action that relates to this schedule resource.
0..1	PowerBidSchedule	0..*	<a href="#">PowerBidSchedule</a>	(NC) Power bid schedule which belongs to a schedule resource.
0..*	PrimaryEnergySource	0..1	<a href="#">EnergyType</a>	(NC) Primary energy reference type for this schedule resource.
0..1	ScheduleResourceController	0..1	<a href="#">ScheduleResourceController</a>	(NC) Schedule resource controller for this schedule resource.

mult from	name	mult to	type	description
0..1	SubScheduleResource	0..*	<a href="#">ScheduleResource</a>	(NC) The subschedule resource that relates to the schedule resource.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1571

1572 **3.3.6 (NC) SchedulingArea**

1573 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1574 An area where production and/or consumption of energy can be forecasted, scheduled and  
 1575 measured. The area is operated by only one system operator, typically a Transmission System  
 1576 Operator (TSO). The area can consist of a sub area, which has the same definition as the main  
 1577 area, but it can be operated by another system operator (typically Distributed System Operator  
 1578 (DSO) or a Closed Distributed System Operator (CDSO)). This includes microgrid concept. A  
 1579 substation is the smallest grouping that can be included in the area. The area size should be  
 1580 considered in terms of the possibility of accumulated reading (settlement metering) and the  
 1581 capability of operating as an island.

1582 Table 10 shows all attributes of SchedulingArea.

1583

**Table 10 – Attributes of ExtArea::SchedulingArea**

name	mult	type	description
isIslandingEnabled	0..1	Boolean	(NC) Identifies if the area can operate in island operation. If true, the area is enabled (capable) of operating as an electrical island. If false, the area does not have the capability or it is not enabled to operate as an electrical island.
isMeteringGridArea	0..1	Boolean	(NC) Identifies if the area is settlement metered for all import and export to the area. If true, the area is metered area. If false, it is not.
normalParticipationFactor or	0..1	Float	(NC) Normal participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.  In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ .  In the case of priority strategy, the item with the lowest number gets allocated energy first.
p	0..1	ActivePower	(NC) Netted active power representing production, consumption and import/export for the scheduling area.
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection

name	mult	type	description
			of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ . In the case of priority strategy, the item with the lowest number gets allocated energy first.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1584

1585

1586

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

**Table 11 – Association ends of ExtArea::SchedulingArea with other classes**

mult from	name	mult to	type	description
0..1	Substation	0..*	Substation	(NC) The substation that is part of this scheduling area.
0..1	Line	0..*	Line	(NC) The line that is part of this scheduling area.
1..*	ControlArea	0..1	ControlArea	(NC) The control area for this scheduling area.
0..1	DCTieCorridor	0..1	<a href="#">DCTieCorridor</a>	(NC) The DC tie corridor that is part of this scheduling area.
0..1	PowerSchedule	0..*	<a href="#">PowerSchedule</a>	Power schedule which belongs to the scheduling area.
0..1	ScheduleResource	0..*	<a href="#">ScheduleResource</a>	(NC) The schedule resource that belongs to this scheduled area.
1..1	AreaDispatchableUnit	0..*	<a href="#">AreaDispatchableUnit</a>	(NC) The area dispatchable unit related to a scheduling area.
0..1	EnergyGroup	0..*	<a href="#">EnergyGroup</a>	(NC) The energy group belonging to a given energy scheduling area.
1..1	SubSchedulingArea	0..*	<a href="#">SubSchedulingArea</a>	(NC) The subscheduling area that belongs to this scheduling area.
0..*	SynchronousArea	0..1	<a href="#">SynchronousArea</a>	(NC) The synchronous area that has this scheduling area.
0..*	SystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) The system operator for this scheduling area.
0..*	LoadFrequencyControlArea	0..1	<a href="#">LoadFrequencyControlArea</a>	(NC) The load frequency control area which has this scheduling area.
0..*	EnergyCoordinationRegion	0..1	<a href="#">EnergyCoordinationRegion</a>	(NC) The energy coordination region that has this scheduling area.
1..*	BiddingZone	1..1	<a href="#">BiddingZone</a>	(NC) The bidding zone related to this scheduling area.
0..1	PowerShiftKeyStrategy	0..*	<a href="#">PowerShiftKeyStrategy</a>	(NC) Power Shift Key Strategy which has a scheduling area.

mult from	name	mult to	type	description
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1587

1588 **3.3.7 (NC) SensitivityArea**1589 Inheritance path = [InfluenceArea](#) : [MonitoringArea](#) : PowerSystemResource : IdentifiedObject :  
1590 ExtEulIdentifiedObject

1591 A monitoring area that defines the required observability area given by the sensitivity factors.

1592 Table 12 shows all attributes of SensitivityArea.

1593

**Table 12 – Attributes of ExtArea::SensitivityArea**

name	mult	type	description
identificationInfluenceFactor	0..1	PerCent	(NC) inherited from: <a href="#">InfluenceArea</a>
filteringInfluenceFactor	0..1	PerCent	(NC) inherited from: <a href="#">InfluenceArea</a>
voltageInfluenceFactor	0..1	PerCent	(NC) inherited from: <a href="#">InfluenceArea</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1594

1595 Table 13 shows all association ends of SensitivityArea with other classes.

1596

**Table 13 – Association ends of ExtArea::SensitivityArea with other classes**

mult from	name	mult to	type	description
0..1	QuantitativeRemedialActionImpact	0..*	<a href="#">QuantitativeRemedialActionImpact</a>	(NC) Quantitative remedial action impact when the remedial action is influencing equipment included in the sensitivity area.
0..*	SynchronousArea	0..1	<a href="#">SynchronousArea</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..*	Region	0..1	<a href="#">Region</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..1	AreaBorderTerminal	0..*	<a href="#">AreaBorderTerminal</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..*	SystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..1	PowerFrequencyController	0..1	<a href="#">PowerFrequencyController</a>	(NC) inherited from: <a href="#">MonitoringArea</a>

mult from	name	mult to	type	description
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1597

### 1598 3.3.8 (NC) SubSchedulingArea

1599 Inheritance path = [SchedulingArea](#) : PowerSystemResource : IdentifiedObject :  
1600 ExtEulIdentifiedObject

1601 An area that is a part of another scheduling area. Typically part of a Transmission System  
1602 Operator (TSO) scheduling area operated by a Distributed System Operator (DSO) or a Close  
1603 Distributed System Operator (CDSO). This includes microgrid concept. A sub scheduling area  
1604 can contain other sub areas. A sub scheduling area leaf will form the smallest entity of any  
1605 given energy area.

1606 Table 14 shows all attributes of SubSchedulingArea.

1607

**Table 14 – Attributes of ExtArea::SubSchedulingArea**

name	mult	type	description
isIslandingEnabled	0..1	Boolean	(NC) inherited from: <a href="#">SchedulingArea</a>
isMeteringGridArea	0..1	Boolean	(NC) inherited from: <a href="#">SchedulingArea</a>
normalParticipationFactor	0..1	Float	(NC) inherited from: <a href="#">SchedulingArea</a>
p	0..1	ActivePower	(NC) inherited from: <a href="#">SchedulingArea</a>
participationFactor	0..1	Float	(NC) inherited from: <a href="#">SchedulingArea</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1608

1609 Table 15 shows all association ends of SubSchedulingArea with other classes.

1610

**Table 15 – Association ends of ExtArea::SubSchedulingArea with other classes**

mult from	name	mult to	type	description
0..1	Feeder	0..*	Feeder	(NC) The feeder that is part of this subscheduling area.
0..*	SchedulingArea	1..1	<a href="#">SchedulingArea</a>	(NC) The scheduling area that has this subscheduling area.

mult from	name	mult to	type	description
0..1	Substation	0..*	Substation	(NC) inherited from: <a href="#">SchedulingArea</a>
0..1	Line	0..*	Line	(NC) inherited from: <a href="#">SchedulingArea</a>
1..*	ControlArea	0..1	ControlArea	(NC) inherited from: <a href="#">SchedulingArea</a>
0..1	DCTieCorridor	0..1	<a href="#">DCTieCorridor</a>	(NC) inherited from: <a href="#">SchedulingArea</a>
0..1	PowerSchedule	0..*	<a href="#">PowerSchedule</a>	inherited from: <a href="#">SchedulingArea</a>
0..1	ScheduleResource	0..*	<a href="#">ScheduleResource</a>	(NC) inherited from: <a href="#">SchedulingArea</a>
1..1	AreaDispatchableUnit	0..*	<a href="#">AreaDispatchableUnit</a>	(NC) inherited from: <a href="#">SchedulingArea</a>
0..1	EnergyGroup	0..*	<a href="#">EnergyGroup</a>	(NC) inherited from: <a href="#">SchedulingArea</a>
1..1	SubSchedulingArea	0..*	<a href="#">SubSchedulingArea</a>	(NC) inherited from: <a href="#">SchedulingArea</a>
0..*	SynchronousArea	0..1	<a href="#">SynchronousArea</a>	(NC) inherited from: <a href="#">SchedulingArea</a>
0..*	SystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">SchedulingArea</a>
0..*	LoadFrequencyControlArea	0..1	<a href="#">LoadFrequencyControlArea</a>	(NC) inherited from: <a href="#">SchedulingArea</a>
0..*	EnergyCoordinationRegion	0..1	<a href="#">EnergyCoordinationRegion</a>	(NC) inherited from: <a href="#">SchedulingArea</a>
1..*	BiddingZone	1..1	<a href="#">BiddingZone</a>	(NC) inherited from: <a href="#">SchedulingArea</a>
0..1	PowerShiftKeyStrategy	0..*	<a href="#">PowerShiftKeyStrategy</a>	(NC) inherited from: <a href="#">SchedulingArea</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1611

### 1612 3.3.9 (NC) SynchronousArea

1613 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

1614 A synchronous area is an electrical area covered by interconnect with a common system  
1615 frequency in a steady-state.

1616 Table 16 shows all attributes of SynchronousArea.

1617

**Table 16 – Attributes of ExtArea::SynchronousArea**

name	mult	type	description
frequency	0..1	Frequency	(NC) The frequency of the electrical power system that can be measured in all network areas of the synchronous system under the assumption of a coherent value for the system in the time frame of seconds (with minor differences between different measurement locations only).
nominalFrequency	0..1	Frequency	(NC) The nominal frequency for the Synchronous Area, e.g. 50 Hz for Europe.

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1618

1619

Table 17 shows all association ends of SynchronousArea with other classes.

1620

**Table 17 – Association ends of ExtArea::SynchronousArea with other classes**

mult from	name	mult to	type	description
0..1	SchedulingArea	0..*	<a href="#">SchedulingArea</a>	(NC) The scheduling area that is part of this synchronous area.
0..1	MonitoringArea	0..*	<a href="#">MonitoringArea</a>	(NC) The monitoring area that is part of this synchronous area.
0..1	LoadFrequencyControlBlock	0..*	<a href="#">LoadFrequencyControlBlock</a>	(NC) The load frequency control block that is part of this synchronous area.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1621

1622

### 3.3.10 (NC) AreaBorderTerminal root class

1623

Area border terminal defines the terminals that are defining a monitoring area.

1624

Table 18 shows all attributes of AreaBorderTerminal.

1625

**Table 18 – Attributes of ExtArea::AreaBorderTerminal**

name	mult	type	description
mRID	0..1	String	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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

1626

1627

Table 19 shows all association ends of AreaBorderTerminal with other classes.

1628 **Table 19 – Association ends of ExtArea::AreaBorderTerminal with other classes**

mult from	name	mult to	type	description
0..*	Terminal	0..1	Terminal	The Terminal that is part of an AreaBorderTerminal.
0..*	MonitoringArea	0..1	<a href="#">MonitoringArea</a>	(NC) The MonitoringArea defined by this AreaBorderTerminal.

1629

1630 **3.3.11 (NC) BiddingZone**

1631 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1632 A bidding zone is a market-based method for handling power transmission congestion. It  
1633 consists of scheduling areas that include the relevant production (supply) and consumption  
1634 (demand) to form an electrical area with the same market price without capacity allocation.

1635 Table 20 shows all attributes of BiddingZone.

1636

**Table 20 – Attributes of ExtArea::BiddingZone**

name	mult	type	description
isTradeEnabled	0..1	Boolean	(NC) Identifies the mechanism for determining the energy price for a given bidding zone. If true, the bid and the offer is expected to be provided for the bidding zone to create the market price. If false, other mechanism determines the price of energy for a given bidding zone, e.g. virtual bidding zone.
netPosition	0..1	ActivePower	(NC) Net position is the netted sum of electricity exports and imports for each market time unit for a bidding zone.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1637

1638 Table 21 shows all association ends of BiddingZone with other classes.

1639

**Table 21 – Association ends of ExtArea::BiddingZone with other classes**

mult from	name	mult to	type	description
1..1	SchedulingArea	1..*	<a href="#">SchedulingArea</a>	(NC) The scheduling area that has bidding zone.
0..*	CapacityCalculationRegion	0..1	<a href="#">CapacityCalculationRegion</a>	(NC) The capacity calculation region related to this bidding zone.
0..*	PowerCapacity	0..1	<a href="#">PowerCapacity</a>	(NC) Power capacity which is associated to the bidding zone.
1..1	BiddingZoneBorderOne	1..*	<a href="#">BiddingZoneBorder</a>	(NC) The primary side of the border.
1..1	BiddingZoneBorderTwo	0..*	<a href="#">BiddingZoneBorder</a>	(NC) The secondary side of the border.
0..1	PowerRemedialAction	0..*	<a href="#">PowerRemedialAction</a>	(NC) The power remedial action applied to this BiddingZone.
1..1	BiddingZoneAction	0..*	<a href="#">BiddingZoneAction</a>	(NC) The bidding zone action that relates to this bidding zone.

mult from	name	mult to	type	description
0..1	CapacitySchedule	0..*	<a href="#">CapacitySchedule</a>	(NC) Capacity schedule which contains information on the referred bidding zone.
0..1	AreaInterchangeController	0..1	<a href="#">AreaInterchangeController</a>	(NC) Area interchange controller for this bidding zone.
0..1	PowerSchedule	0..*	<a href="#">PowerSchedule</a>	(NC) Power schedule which belongs to the power bidding zone.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1640

1641 **3.3.12 (NC) BiddingZoneBorder**

1642 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1643 Defines the aggregated connection capacity between two Bidding Zones.

1644 Table 22 shows all attributes of BiddingZoneBorder.

1645

**Table 22 – Attributes of ExtArea::BiddingZoneBorder**

name	mult	type	description
transmissionReliabilityMargin	0..1	ActivePower	(NC) Transmission Reliability Margin (TRM) is the minimum reserve that system operators must have available at their connections so that they can help other countries to which their system is directly or indirectly connected, if necessary.
totalTransferCapacity	0..1	ActivePower	(NC) Total Transfer Capacity (TTC) is the maximum exchange program between two areas compatible with operational security standards applicable at each system if future network conditions, generation and load patterns were perfectly known in advance.
netTransferCapacity	0..1	ActivePower	(NC) Net Transfer Capacity (NTC) is defined as $NTC = TTC - TRM$ and corresponds to the maximum exchange between two areas compatible with operational security limits applicable in both areas and taking into account the technical uncertainties on future network conditions.
alreadyAllocatedCapacity	0..1	ActivePower	(NC) Already Allocated Capacity (AAC) means the total amount of allocated transmission rights i.e. transmission capacity reserved by virtue of historical long-term contracts and the previously held transmission capacity reservation auctions.
availableTransferCapacity	0..1	ActivePower	(NC) Available Transfer Capacity (ATC) means the transmission capacity that remains available, after allocation procedure, to be used under the physical conditions of the transmission system. ATC value is defined as: $ATC = NTC - AAC$ .

name	mult	type	description
alreadyAllocatedFlow	0..1	ActivePower	(NC) The maximum allowed flow on the collection of interconnection between two bidding zones.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1646

1647

Table 23 shows all association ends of BiddingZoneBorder with other classes.

1648

**Table 23 – Association ends of ExtArea::BiddingZoneBorder with other classes**

mult from	name	mult to	type	description
1..*	BiddingZoneOne	1..1	<a href="#">BiddingZone</a>	(NC) The bidding zone for the primary side.
0..*	BiddingZoneTwo	1..1	<a href="#">BiddingZone</a>	(NC) The bidding zone for the secondary side.
0..1	PowerSchedule	0..*	<a href="#">PowerSchedule</a>	(NC) Power schedule which has bidding zone border.
0..1	CrossBorderRelevance	0..*	<a href="#">CrossBorderRelevance</a>	(NC) Cross border relevant combination for this bidding zone border.
0..*	CapacityCalculationRegion	0..1	<a href="#">CapacityCalculationRegion</a>	(NC) The capacity calculation region for which the capacity is derived from.
0..1	TieCorridor	0..*	<a href="#">TieCorridor</a>	(NC) Tie corridor for a given bidding zone border.
0..1	AreaInterchangeController	0..1	<a href="#">AreaInterchangeController</a>	(NC) Area interchange controller that relates to this bidding zone border.
0..1	PowerRemedialAction	0..*	<a href="#">PowerRemedialAction</a>	(NC) Power remedial action applied to this Bidding Zone Border.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1649

1650

### 3.3.13 (NC) CapacityCalculationRegion

1651

Inheritance path = [Region](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1652

Capacity calculation region is a coherent part of the interconnected system that is used for calculating the transmission capacity for a bidding zone or between bidding zones.

1653

Table 24 shows all attributes of CapacityCalculationRegion.

1654

1655

**Table 24 – Attributes of ExtArea::CapacityCalculationRegion**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1656

1657

Table 25 shows all association ends of CapacityCalculationRegion with other classes.

1658

**Table 25 – Association ends of ExtArea::CapacityCalculationRegion with other classes**

mult from	name	mult to	type	description
0..1	BiddingZoneBorder	0..*	<a href="#">BiddingZoneBorder</a>	(NC) The bidding zone border on which the capacity is calculated.
0..1	BiddingZone	0..*	<a href="#">BiddingZone</a>	(NC) The bidding zone for this capacity calculation region.
0..*	SecurityCoordinator	0..1	<a href="#">SecurityCoordinator</a>	(NC) The security coordinator responsible for the capacity calculation region.
0..*	CoordinatedCapacityCalculator	0..1	<a href="#">CoordinatedCapacityCalculator</a>	(NC) Coordinated capacity calculator responsible for the capacity calculation of the region.
0..1	ConservativeAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">Region</a>
0..1	RemedialAction	0..*	<a href="#">RemedialAction</a>	(NC) inherited from: <a href="#">Region</a>
0..1	SecuredAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">Region</a>
0..1	RemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) inherited from: <a href="#">Region</a>
0..1	LimitViolation	0..*	<a href="#">PowerFlowResult</a>	(NC) inherited from: <a href="#">Region</a>
0..1	MonitoringArea	0..*	<a href="#">MonitoringArea</a>	(NC) inherited from: <a href="#">Region</a>
0..*	OverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">Region</a>
0..1	ScannedAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">Region</a>
0..1	NativeAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">Region</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1659

1660 **3.3.14 (NC) ContingencyArea**

1661 Inheritance path = [InfluenceArea](#) : [MonitoringArea](#) : PowerSystemResource : IdentifiedObject :  
1662 ExtEulIdentifiedObject

1663 A monitoring area that defines the required contingency elements. This includes elements that  
1664 are part of the external contingency list.

1665 Table 26 shows all attributes of ContingencyArea.

1666

**Table 26 – Attributes of ExtArea::ContingencyArea**

name	mult	type	description
identificationInfluenceFactor	0..1	PerCent	(NC) inherited from: <a href="#">InfluenceArea</a>
filteringInfluenceFactor	0..1	PerCent	(NC) inherited from: <a href="#">InfluenceArea</a>
voltageInfluenceFactor	0..1	PerCent	(NC) inherited from: <a href="#">InfluenceArea</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1667

1668 Table 27 shows all association ends of ContingencyArea with other classes.

1669

**Table 27 – Association ends of ExtArea::ContingencyArea with other classes**

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	<a href="#">SynchronousArea</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..*	Region	0..1	<a href="#">Region</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..1	AreaBorderTerminal	0..*	<a href="#">AreaBorderTerminal</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..*	SystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..1	PowerFrequencyController	0..1	<a href="#">PowerFrequencyController</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1670

1671 **3.3.15 (NC) EnergyCoordinationRegion**

1672 Inheritance path = [Region](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1673 A region that has a common organisation or a service that is responsible for alignment of  
1674 forecast and scheduling of energy.  
1675 Table 28 shows all attributes of EnergyCoordinationRegion.

1676 **Table 28 – Attributes of ExtArea::EnergyCoordinationRegion**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1677

1678 Table 29 shows all association ends of EnergyCoordinationRegion with other classes.

1679 **Table 29 – Association ends of ExtArea::EnergyCoordinationRegion with other classes**

mult from	name	mult to	type	description
0..1	SchedulingArea	0..*	<a href="#">SchedulingArea</a>	(NC) The scheduling area that is part of this energy coordination region.
0..*	EnergyAlignmentCoordinator	0..1	<a href="#">EnergyAlignmentCoordinator</a>	(NC) The energy alignment coordinator that operates this energy coordination region.
0..1	ConservativeAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">Region</a>
0..1	RemedialAction	0..*	<a href="#">RemedialAction</a>	(NC) inherited from: <a href="#">Region</a>
0..1	SecuredAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">Region</a>
0..1	RemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) inherited from: <a href="#">Region</a>
0..1	LimitViolation	0..*	<a href="#">PowerFlowResult</a>	(NC) inherited from: <a href="#">Region</a>
0..1	MonitoringArea	0..*	<a href="#">MonitoringArea</a>	(NC) inherited from: <a href="#">Region</a>
0..*	OverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">Region</a>
0..1	ScannedAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">Region</a>
0..1	NativeAssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">Region</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1680

1681 **3.3.16 (NC) InfluenceArea**1682 Inheritance path = [MonitoringArea](#) : PowerSystemResource : IdentifiedObject :  
1683 ExtEulIdentifiedObject1684 Influence area is a monitoring area that is defined by calculating the equipment that is affected  
1685 by the influence factors.

1686 Table 30 shows all attributes of InfluenceArea.

1687

**Table 30 – Attributes of ExtArea::InfluenceArea**

name	mult	type	description
identificationInfluenceFactor	0..1	PerCent	(NC) Power flow identification influence factor of a network element that is normalised in order to take into account potential impacts induced by differences in Permanently Admissible Transmission Loading (PATL) values. This is referred as identification influence threshold in CSA methodology. The allowed value range is [0,100].
filteringInfluenceFactor	0..1	PerCent	(NC) Power flow filtering influence factor of a network element not normalised. This is referred as power flow influence threshold in CSA methodology. The allowed value range is [0,100].
voltageInfluenceFactor	0..1	PerCent	(NC) Voltage influence factor of a network element as defined in the CSA methodology. The allowed value range is [0,100].
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1688

1689 Table 31 shows all association ends of InfluenceArea with other classes.

1690

**Table 31 – Association ends of ExtArea::InfluenceArea with other classes**

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	<a href="#">SynchronousArea</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..*	Region	0..1	<a href="#">Region</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..1	AreaBorderTerminal	0..*	<a href="#">AreaBorderTerminal</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..*	SystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..1	PowerFrequencyController	0..1	<a href="#">PowerFrequencyController</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1691

1692 **3.3.17 (NC) LoadFrequencyControlArea**

1693 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1694 A part of a synchronous area or an entire synchronous area, physically demarcated by points  
1695 of measurement at interconnectors to other load frequency control (LFC) areas, operated by  
1696 one or more TSOs fulfilling the obligations of load-frequency control.

1697 Table 32 shows all attributes of LoadFrequencyControlArea.

1698

**Table 32 – Attributes of ExtArea::LoadFrequencyControlArea**

name	mult	type	description
deficientGenerationLimit	0..1	PerCent	(NC) Percentage of average dispatch target plus average regulation used to calculate Deficient Generation Limit. The value shall be a positive value between 0 and 100.
frequencyBiasFactor	0..1	Float	(NC) Frequency bias in MW/Hz.
includeFrequencyBias	0..1	Boolean	(NC) True means the frequency bias that is taken into consideration in the frequency bias computation.
frequencyRestorationReserveDelay	0..1	Seconds	(NC) FRR delay expressed in seconds. Must be a positive multiple of AGC's cycle duration.
frequencyRestorationReserveMaxRamp	0..1	ActivePowerChangeRate	(NC) Maximum authorized ramp for both FRR dispatching and ramp to zero.
frequencyRestorationReserveThreshold	0..1	ActivePower	(NC) Authorized threshold for both FRR dispatching and ramp to zero.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1699

1700 Table 33 shows all association ends of LoadFrequencyControlArea with other classes.

1701 **Table 33 – Association ends of ExtArea::LoadFrequencyControlArea with other classes**

mult from	name	mult to	type	description
0..1	SchedulingArea	0..*	<a href="#">SchedulingArea</a>	(NC) The scheduling area that is part of this load frequency control area.
0..*	LoadFrequencyControlBlock	0..1	<a href="#">LoadFrequencyControlBlock</a>	(NC) The load frequency control block that has this load frequency control area.
0..*	FrequencyControlOperator	0..1	<a href="#">LoadFrequencyControlOperator</a>	(NC) The frequency control operator that operates this frequency control area.
0..1	TieCorridor	0..*	<a href="#">TieCorridor</a>	(NC) TieCorridor controlled by the LoadFrequencyControlArea.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1702

1703 **3.3.18 (NC) LoadFrequencyControlBlock**

1704 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1705 A part of a synchronous area or an entire synchronous area, physically demarcated by points  
1706 of measurement at interconnectors to other load frequency control (LFC) blocks, consisting of  
1707 one or more LFC areas, operated by one or more TSOs fulfilling the obligations of load-  
1708 frequency control.

1709 Table 34 shows all attributes of LoadFrequencyControlBlock.

1710

**Table 34 – Attributes of ExtArea::LoadFrequencyControlBlock**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1711

1712 Table 35 shows all association ends of LoadFrequencyControlBlock with other classes.

**Table 35 – Association ends of ExtArea::LoadFrequencyControlBlock with other classes**

1713

1714

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	<a href="#">SynchronousArea</a>	(NC) The synchronous area that has this load frequency control block.
0..1	LoadFrequencyControlArea	0..*	<a href="#">LoadFrequencyControlArea</a>	(NC) The load frequency control area that is part of this load frequency control block.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1715

1716 **3.3.19 (NC) MonitoringArea**

1717 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

1718 A coherent part of the interconnected electrical power system, that includes the system  
1719 operators' responsibility area and the surrounding parts of other system operators' responsibility  
1720 area, that need to be monitored for security assessment.

1721 Table 36 shows all attributes of MonitoringArea.

1722

**Table 36 – Attributes of ExtArea::MonitoringArea**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1723

1724 Table 37 shows all association ends of MonitoringArea with other classes.

1725

**Table 37 – Association ends of ExtArea::MonitoringArea with other classes**

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	<a href="#">SynchronousArea</a>	(NC) The synchronous area that has this monitoring area.
0..*	Region	0..1	<a href="#">Region</a>	(NC) Region that has monitoring areas.
0..1	AreaBorderTerminal	0..*	<a href="#">AreaBorderTerminal</a>	(NC) The AreaBorderTerminal which defines the MonitoringArea.
0..*	SystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) The system operator that operates this monitoring area.
0..1	PowerFrequencyController	0..1	<a href="#">PowerFrequencyController</a>	(NC) Power frequency controller that applied to this monitoring area.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1726

1727 **3.3.20 (NC) ObservabilityArea**1728 Inheritance path = [MonitoringArea](#) : PowerSystemResource : IdentifiedObject :  
1729 ExtEulIdentifiedObject

1730 A monitoring area that is given by a real time measurement.

1731 Table 38 shows all attributes of ObservabilityArea.

1732 **Table 38 – Attributes of ExtArea::ObservabilityArea**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1733

1734 Table 39 shows all association ends of ObservabilityArea with other classes.

1735 **Table 39 – Association ends of ExtArea::ObservabilityArea with other classes**

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	<a href="#">SynchronousArea</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..*	Region	0..1	<a href="#">Region</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..1	AreaBorderTerminal	0..*	<a href="#">AreaBorderTerminal</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..*	SystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..1	PowerFrequencyController	0..1	<a href="#">PowerFrequencyController</a>	(NC) inherited from: <a href="#">MonitoringArea</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1736

1737 **3.3.21 (NC) PowerCapacity root class**1738 Power capacity defines the capacity in regard to generation, consumption and transmission  
1739 (import and export) for a relevant power system resource, e.g. bidding zone, including maximum  
1740 and minimum electrical power capacity and any capacity allocation.

1741 Table 40 shows all attributes of PowerCapacity.

1742 **Table 40 – Attributes of ExtArea::PowerCapacity**

name	mult	type	description
maxInterchange	0..1	ActivePower	(NC) Maximum total active power (AC and DC) that the net position for the bidding zone can

name	mult	type	description
			have to maintain operational security. Positive sign means flow into the bidding zone.
minImportP	0..1	ActivePower	(NC) Minimum imported active power requirement.
minInterchange	0..1	ActivePower	(NC) Minimum total active power (AC and DC) that the net position for the bidding zone can have to maintain operational security. Negative sign means flow out of the bidding zone.
netACInterchange	0..1	ActivePower	(NC) The netted aggregation of all AC external schedules of an area. Positive sign means flow into the area (Import).
netACInterchangeTolerance	0..1	Float	(NC) The area AC Net Position tolerance.
netDCInterchange	0..1	ActivePower	(NC) The netted aggregation of all DC external schedules of an area. Positive sign means flow into the area.
regulatingUpAllocation	0..1	ActivePower	(NC) The balancing capacity allocated for regulating up, by increasing the production, decreasing the direct current export, increasing direct current import or reducing the consumption of energy in the bidding zone. This must be a positive number.
regulatingDownAllocation	0..1	ActivePower	(NC) The balancing capacity allocated for regulating down, by decreasing the production, increasing the direct current export, decreasing direct current import or increasing the consumption of energy in the bidding zone. This must be a positive number.

1743

1744

Table 41 shows all association ends of PowerCapacity with other classes.

1745

**Table 41 – Association ends of ExtArea::PowerCapacity with other classes**

mult from	name	mult to	type	description
0..1	BiddingZone	0..*	<a href="#">BiddingZone</a>	(NC) Bidding zone which has a power capacity.

1746

### 1747 3.4 Assessed element extensions

#### 1748 3.4.1 General

1749 This package contains the extensions related to the assessed element.



name	mult	type	description
			True means that the assessed element is scanned in the base case. False means it is not scanned in the base case.
maxFlow	0..1	ActivePower	(NC) Maximum flow on a conducting equipment or a collection of conducting equipment forming a power transfer corridor. For assessed element that becomes critical due to contingency, this value represents the maximum flow with remedial action taken into consideration.
targetCrossZonalCapacityMargin	0..1	PerCent	(NC) Agreed target margin for the cross zonal capacity trading given by the percentage of a zero exchange situation flow (Net position equals zero) and maximum flow.  In other words, when bidding zone exchange equals 0 MW commercially (in the market), the assessed element (ConductingEquipment or PowerTransferCorridor) should be loaded less than maximum loading (100%) minus the target. e.g. If the target is 70%, the loading must be less than 30%.  The allowed value range is [0,100].
insideCapacityMargin	0..1	PerCent	(NC) Percentage of the maximum flow (margin) from coordinated capacity calculation, i.e. capacity available for cross-zonal trade within the considered coordination area.  The allowed value range is [0,100].
outsideCapacityMargin	0..1	PerCent	(NC) Percentage of the maximum flow (margin) capacity calculation, i.e. the capacity available for cross-zonal trade outside the considered coordination area.  The allowed value range is [0,100].
criticalElementContingency	0..1	<a href="#">CriticalElementContingencyKind</a>	(NC) Indicates the type of the critical element contingency.
maxMarginAdjustment	0..1	PerCent	(NC) Maximum adjustment, relative to maximum flow allowed for exceeding the maximum flow of this assessed element.  The allowed value range is [0,100].
flowReliabilityMargin	0..1	PerCent	(NC) Percentage of the maximum flow (margin) reserved to anticipate forecasting errors.  The allowed value range is [0,100].
targetRemainingAvailableMargin	0..1	PerCent	(NC) Target for the remaining available margin as a percentage of maximum flow.  The allowed value range is [0,100].
normalEnabled	0..1	Boolean	(NC) If true, the assessed element shall be considered under normal operating conditions.
enabled	0..1	Boolean	(NC) If true, the assessed element is enabled, otherwise it is disabled.
normalMaxFlow	0..1	ActivePower	(NC) Maximum flow on a conducting equipment or a collection of conducting equipment forming a power transfer corridor under normal operating conditions. For assessed elements that become critical due to contingency, this value represents the maximum flow with remedial action taken into consideration.
normalAppointedMargin	0..1	PerCent	(NC) The normal percentage (appointed to a region) of the remaining margin obtained in the grid model to reach its current limit under normal operating conditions. The maximum percentage shall by default be 10% of the remaining margin.

name	mult	type	description
			It is only used when an assessed element is considered conservative for a region. The allowed value range is [0,100].
normalPositiveVirtualMargin	0..1	PerCent	(NC) A positive margin that defines the overload allowed in a solution for the assessed element for a normal situation. The margin represents influences that can be solved by the System Operators using available remedial action which is not cross-border relevant remedial action. All relevant operational limits (e.g. PATL, TATL, etc) are modified by this margin value. The attribute represents the increase. The allowed value range is [0,100].
positiveVirtualMargin	0..1	PerCent	(NC) A positive margin that defines the overload allowed in a solution for the assessed element for the current situation. The margin represents influences that can be solved by the System Operators using available remedial action which is not cross-border relevant remedial action. All relevant operational limits (e.g. PATL, TATL, etc) are modified by this margin value. The attribute represents the increase. The allowed value range is [0,100].
exclusionReason	0..1	<a href="#">SecuredExclusionReasonKind</a>	(NC) Reason for not associating this assessed element with a secured region.
scannedThresholdMargin	0..1	PerCent	(NC) Threshold percentage that a scanned element can be overloaded, on a given element, on top of any overload prior to optimisation (default= 5%). e.g. Initial loading of the element is 110%, with a 5% scanned threshold margin, the new maximum is 115% of the limit (e.g. PATL, TATL, etc). The allowed value range is [0,100].
isCombinableWithRemedialAction	0..1	Boolean	(NC) Defines if the AssessedElement is available to be combined with RemedialAction. If true, this AssessedElement can be included in various combinations not defined in the data exchange in an explicit way. If false, this assessed element is not to be considered in any combination with remedial actions and contingencies except for the exclusive combination.
isCombinableWithContingency	0..1	Boolean	(NC) Defines if the AssessedElement is available to be combined with Contingency. If true, this AssessedElement can be included in various combinations not defined in the data exchange in an explicit way. If false, this assessed element is not to be considered in any combination with remedial actions and contingencies except for the exclusive combination.
normalScannedThresholdMargin	0..1	PerCent	(NC) Normal threshold percentage that a scanned element can be overloaded, on a given element, on top of any overload prior to optimisation (default= 5%). e.g. Initial loading of the element is 110%, with a 5% scanned threshold margin, the new maximum is 115% of the limit (e.g. PATL, TATL, etc). The allowed value range is [0,100].
appointedMargin	0..1	PerCent	(NC) The percentage (appointed to a region) of the remaining margin obtained in the grid model to reach its current limit under normal operating conditions. The maximum percentage shall by default be 10% of the remaining margin.

name	mult	type	description
			It is only used when an assessed element is considered conservative for a region. The allowed value range is [0,100].
individualValidationAdjustment	0..1	ActivePower	(NC) Positive value calculated and provided by System Operators from their individual validation process for the reduction of Remaining Available Margin (RAM) in order to ensure grid security.
coordinatedValidationAdjustment	0..1	ActivePower	(NC) Positive value calculated and provided by the Coordinated Capacity Calculator (CCC) for the reduction of Remaining Available Margin (RAM) in order to ensure grid security.
individualValidationAdjustmentShare	0..1	ActivePower	(NC) Positive value expressed calculated by the Coordinated Capacity Calculator (CCC) based on the provided Individual Validation Adjustment (IVA) by System Operators in order to show the actual reduction of Remaining Available Margin (RAM). Individual Validation Adjustment Share is a positive non-zero value. It is equal or less than the Individual Validation Adjustment value.
individualValidationAdjustmentJustification	0..1	String	(NC) Free text description provided by System Operators for justifying the reduction of Remaining Available Margin (RAM) by means of Individual Validation Adjustment (IVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
coordinatedValidationAdjustmentJustification	0..1	String	(NC) Free text description provided by the coordinated capacity calculator (CCC) for justifying the reduction of Remaining Available Margin (RAM) by means of Coordinated Validation Adjustment (CVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
criticalElementContingencyJustification	0..1	String	(NC) Free text describing the justification of critical element contingency categorization (e.g. the use of the kind). This justification is not intended for any application processing purpose, it should only be used for reporting.
targetRemainingAvailableMarginJustification	0..1	String	(NC) Free text describing the justification for the target Remaining Available Margin (RAM). This justification is not intended for any application processing purpose, it should only be used for reporting.
normalIndividualValidationAdjustment	0..1	ActivePower	(NC) Normal positive value calculated and provided by System Operators from their individual validation process for the reduction of Remaining Available Margin (RAM) in order to ensure grid security.
normalCoordinatedValidationAdjustment	0..1	ActivePower	(NC) Normal positive value calculated and provided by the Coordinated Capacity Calculator (CCC) for the reduction of Remaining Available Margin (RAM) in order to ensure grid security.
normalIndividualValidationAdjustmentShare	0..1	ActivePower	(NC) Normal positive value expressed calculated by the Coordinated Capacity Calculator (CCC) based on the provided Individual Validation Adjustment (IVA) by System Operators in order to show the actual reduction of Remaining Available Margin (RAM). Individual Validation Adjustment Share is a positive non-zero value. It is equal or less than the Individual Validation Adjustment value.

name	mult	type	description
normalIndividualValidationAdjustmentJustification	0..1	String	(NC) Normal free text description provided by System Operators for justifying the reduction of Remaining Available Margin (RAM) by means of Individual Validation Adjustment (IVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
normalCoordinatedValidationAdjustmentJustification	0..1	String	(NC) Normal free text description provided by the coordinated capacity calculator (CCC) for justifying the reduction of Remaining Available Margin (RAM) by means of Coordinated Validation Adjustment (CVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
normalCriticalElementContingencyJustification	0..1	String	(NC) Normal free text describing the justification of critical element contingency categorization (e.g. the use of the kind). This justification is not intended for any application processing purpose, it should only be used for reporting.
normalTargetRemainingAvailableMarginJustification	0..1	String	(NC) Normal free text describing the justification for the target Remaining Available Margin (RAM). This justification is not intended for any application processing purpose, it should only be used for reporting.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 43 shows all association ends of AssessedElement with other classes.

**Table 43 – Association ends of ExtAssessedElement::AssessedElement with other classes**

mult from	name	mult to	type	description
0..*	ConductingEquipment	0..1	ConductingEquipment	(NC) The conducting equipment that is designated as an assessed element, i.e. the equipment that is assessed.
0..*	Line	0..1	Line	(NC) The line that is designated as an assessed element, i.e. the equipment that is assessed.
0..*	OperationalLimit	0..1	OperationalLimit	(NC) The terminal limit that is being assessed against.
0..*	ScannedForRegion	0..1	<a href="#">Region</a>	(NC) This is the region in which this assessed element is scanned.
0..*	NativeRegion	0..1	<a href="#">Region</a>	(NC) The native region for an assessed element.
0..*	AssessedSystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) A system operator that assesses the element.
0..1	AssessedElementWithContingency	0..*	<a href="#">AssessedElementWithContingency</a>	(NC) The contingency and assessed element combination to be simulated for this assessed element.

mult from	name	mult to	type	description
0..*	AssessedPowerTransferCorridor	0..1	<a href="#">PowerTransferCorridor</a>	(NC) The power transfer corridor that is designated as an assessed element.
0..1	AssessedElementSchedule	0..*	<a href="#">AssessedElementSchedule</a>	(NC) Assessed element schedule for an assessed element.
0..*	OverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) The overlapping zone grouping the overlapping assessed elements.
0..*	ConservativeForRegion	0..1	<a href="#">Region</a>	(NC) This is the region where the element is considered conservative.
0..*	SecuredForRegion	0..1	<a href="#">Region</a>	(NC) This is the region where the element is secured.
0..1	ObservableQuantity	0..*	<a href="#">ObservableQuantity</a>	(NC) The observable quantity for this assessed element with contingency.
0..1	AssessedElementWithRemedialAction	0..*	<a href="#">AssessedElementWithRemedialAction</a>	(NC) The assessed element and remedial action combination to be simulated for this assessed element.
0..*	DCTieCorridor	0..1	<a href="#">DCTieCorridor</a>	(NC) The DC tie corridor that is assessed.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) Availability enabled describes the enabling or disabling of this assessed element.
0..1	AssessedElementRegularSchedule	0..*	<a href="#">AssessedElementRegularSchedule</a>	(NC) Regular schedule that belongs to an assessed element.
0..1	CrossBorderRelevance	0..*	<a href="#">CrossBorderRelevance</a>	(NC) The Bidding zone border for which this assessed element is cross border relevant.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1765

### 1766 3.4.3 (NC) AssessedElementWithContingency root class

1767 Combination of an assessed element and a contingency.

1768 Table 44 shows all attributes of AssessedElementWithContingency.

#### 1769 Table 44 – Attributes of ExtAssessedElement::AssessedElementWithContingency

name	mult	type	description
enabled	0..1	Boolean	(NC) If true, the assessed element with contingency is enabled, otherwise it is disabled.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
combinationConstraintKind	0..1	<a href="#">ElementCombinationConstraintKind</a>	(NC) Defines the combination constraint of the AssessedElement and Contingency. If included, this assessed element is only assessed for this

name	mult	type	description
			contingency. Else if excluded, this assessed element should not be assessed for this contingency. Considered shall not be used for this combination.
normalEnabled	0..1	Boolean	(NC) If true, the assessed element with contingency is enabled, otherwise it is disabled under normal operating conditions.

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Table 45 shows all association ends of AssessedElementWithContingency with other classes.

1772

**Table 45 – Association ends of**

1773

**ExtAssessedElement::AssessedElementWithContingency with other classes**

mult from	name	mult to	type	description
0..*	Contingency	0..1	Contingency	(NC) The contingency defined for this contingency and assessed element combination.
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) Enabling schedule which belongs to the assessed element with contingency.
0..*	AssessedElement	0..1	<a href="#">AssessedElement</a>	(NC) The assessed element defined for this contingency and assessed element combination.

1774

1775

**3.4.4 (NC) AssessedElementWithRemedialAction root class**

1776

Combination of an assessed element and a remedial action

1777

Table 46 shows all attributes of AssessedElementWithRemedialAction.

1778

**Table 46 – Attributes of ExtAssessedElement::AssessedElementWithRemedialAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) If true, the assessed element with remedial action is enabled, otherwise it is disabled.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
combinationConstraintKind	0..1	<a href="#">ElementCombinationConstraintKind</a>	(NC) Defines the combination constraint of the AssessedElement and Remedial Action. If included, this remedial action is only assessed for this assessed element. Else if excluded, this remedial action should not be used for this assessed element. Else if considered, this remedial action can be considered for this assessed element.
normalEnabled	0..1	Boolean	(NC) If true, the assessed element with remedial action is enabled, otherwise it is disabled under normal operating conditions.

1779

1780

Table 47 shows all association ends of AssessedElementWithRemedialAction with other classes.

1781

1782  
1783**Table 47 – Association ends of  
ExtAssessedElement::AssessedElementWithRemedialAction with other classes**

mult from	name	mult to	type	description
0..*	AssessedElement	0..1	<a href="#">AssessedElement</a>	(NC) The assessed element defined for this assessed element and remedial action combination.
0..*	RemedialAction	0..1	<a href="#">RemedialAction</a>	(NC) The remedial action defined for this assessed element and remedial action combination.
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) Enabling schedule which belongs to the assessed element with remedial action.

1784

**3.4.5 (NC) ElementCombinationConstraintKind enumeration**

1786 Kind of constraint for an element combination.

1787 Table 48 shows all literals of ElementCombinationConstraintKind.

1788

**Table 48 – Literals of ExtAssessedElement::ElementCombinationConstraintKind**

literal	value	description
included		Element combination is included.
excluded		Element combination is excluded.
considered		Element combination can be considered.

1789

**3.4.6 (NC) SecuredExclusionReasonKind enumeration**

1791 The kind of secured exclusion reason.

1792 Table 49 shows all literals of SecuredExclusionReasonKind.

1793

**Table 49 – Literals of ExtAssessedElement::SecuredExclusionReasonKind**

literal	value	description
systemOperator		The network element that is going to be assessed is excluded for being secured by the system operator.
capacityCalculationRegion		The network element that is going to be assessed is excluded for being secured by the capacity calculation region.
nonNativeCapacityCalculationRegion		The network element that is going to be assessed is excluded for being secured for the native capacity calculation region since it would be secured for a non native capacity calculation region.

1794

**3.4.7 (NC) CriticalElementContingencyKind enumeration**

1796 The kind of critical element contingency.

1797 Table 50 shows all literals of CriticalElementContingencyKind.

1798

**Table 50 – Literals of ExtAssessedElement::CriticalElementContingencyKind**

literal	value	description
validation		Network element should be assessed according to the methodology.

literal	value	description
critical		Network element is considered to be critical according to the methodology.
monitored		Network element is considered to be monitored under contingency.
criticalAndMonitored		Network element is considered to be Critical Network Element monitored under Contingency (CNEC).

1799

### 1800 3.4.8 (NC) CrossBorderRelevance root class

1801 Combination of an assessed element and one or more bidding zone border that are affected by  
1802 the assessment.

1803 Table 51 shows all attributes of CrossBorderRelevance.

1804 **Table 51 – Attributes of ExtAssessedElement::CrossBorderRelevance**

name	mult	type	description
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
normalEnabled	0..1	Boolean	(NC) If true, the cross border relevance shall be considered under normal operating conditions.
enabled	0..1	Boolean	(NC) If true, the cross border relevance is enabled, otherwise it is disabled.

1805

1806 Table 52 shows all association ends of CrossBorderRelevance with other classes.

1807 **Table 52 – Association ends of ExtAssessedElement::CrossBorderRelevance with other**  
1808 **classes**

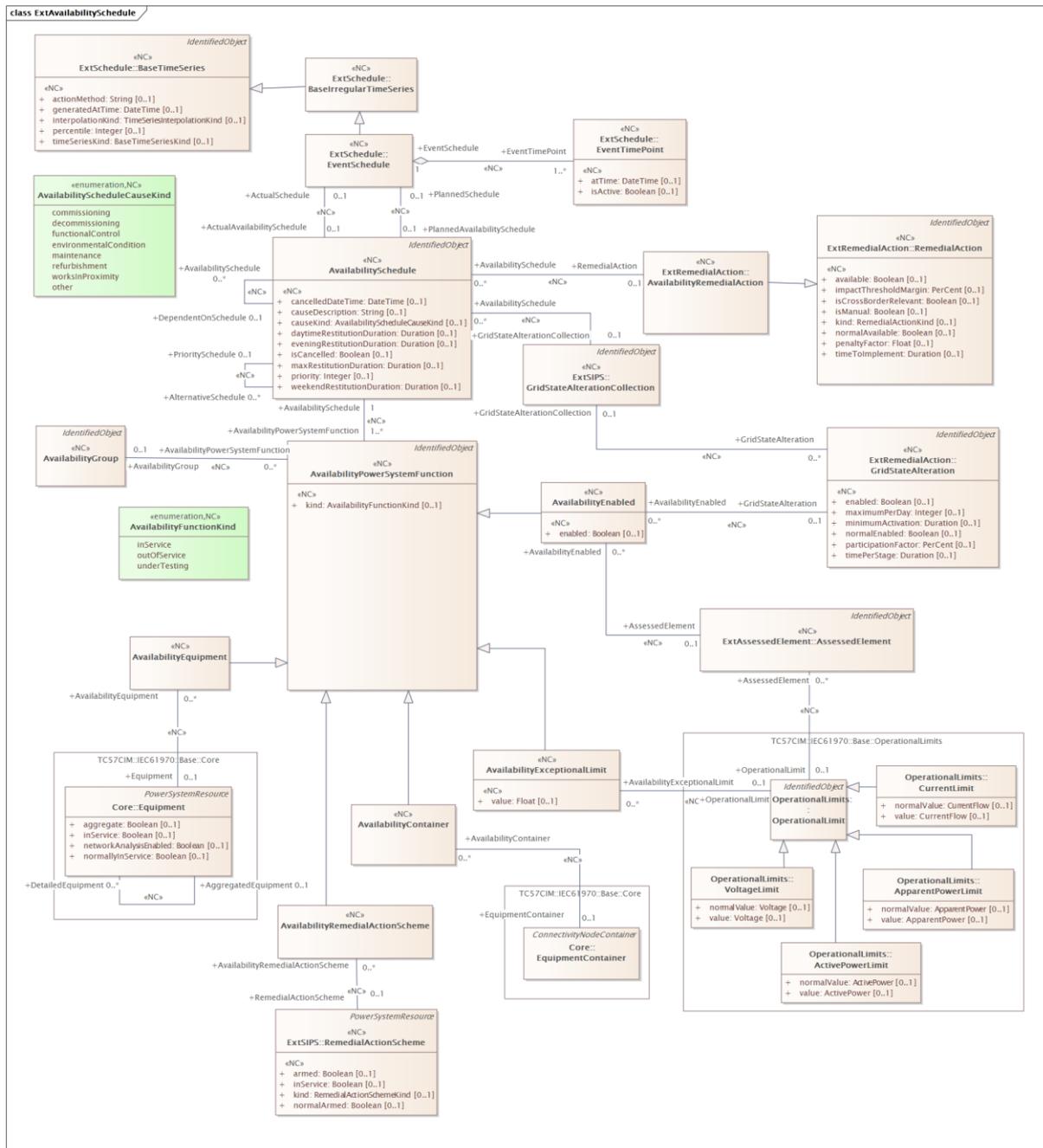
mult from	name	mult to	type	description
0..*	AssessedElement	0..1	<a href="#">AssessedElement</a>	(NC) Assessed element which is cross border relevant.
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) Enabling schedule which belongs to the cross border relevant.
0..*	BiddingZoneBorder	0..1	<a href="#">BiddingZoneBorder</a>	(NC) Bidding zone border relevant for this combination.

1809

## 1810 3.5 Package ExtAvailabilitySchedule

### 1811 3.5.1 General

1812 This package contains the extensions related to the availability schedule.



1813

1814 **Figure 5 – Class diagram ExtAvailabilitySchedule::ExtAvailabilitySchedule**

1815 Figure 5: The diagram contains classes related to availability schedule.

1816 **3.5.2 (NC) AvailabilityEnabled**

1817 Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEulIdentifiedObject  
 1818 Availability enabled is enabling or disabling grid state alteration (e.g. tap position action) or  
 1819 assessed element that is related to the availability schedule. For instance, the cancellation of  
 1820 availability schedule can lead to changes in the assessed element. This is done by enabling  
 1821 one assessment and disabling another.  
 1822 Table 53 shows all attributes of AvailabilityEnabled.

1823

**Table 53 – Attributes of ExtAvailabilitySchedule::AvailabilityEnabled**

name	mult	type	description
enabled	0..1	Boolean	(NC) Instruction to enable or disable alteration and assessment.
kind	0..1	<a href="#">AvailabilityFunctionKind</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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1825

Table 54 shows all association ends of AvailabilityEnabled with other classes.

1826

**Table 54 – Association ends of ExtAvailabilitySchedule::AvailabilityEnabled with other classes**

1827

mult from	name	mult to	type	description
0..*	AssessedElement	0..1	<a href="#">AssessedElement</a>	(NC) Assessed element that is affected by the availability given by this availability enabling.
0..*	GridStateAlteration	0..1	<a href="#">GridStateAlteration</a>	(NC) Grid state alteration that is affected by the availability given by this availability enabling.
0..*	AvailabilityGroup	0..1	<a href="#">AvailabilityGroup</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
1..*	AvailabilitySchedule	1..1	<a href="#">AvailabilitySchedule</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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**3.5.3 (NC) AvailabilityContainer**

1830

Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEulIdentifiedObject

1831

Availability container serves for associating an equipment container with an availability

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schedule. For instance, putting in or out of service all the equipment inside a Line or a Bay in

1833

combination with other availability functions with the same availability schedule.

1834

Table 55 shows all attributes of AvailabilityContainer.

1835

**Table 55 – Attributes of ExtAvailabilitySchedule::AvailabilityContainer**

name	mult	type	description
kind	0..1	<a href="#">AvailabilityFunctionKind</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1836  
1837

Table 56 shows all association ends of AvailabilityContainer with other classes.

1838  
1839

**Table 56 – Association ends of ExtAvailabilitySchedule::AvailabilityContainer with other classes**

mult from	name	mult to	type	description
0..*	EquipmentContainer	0..1	EquipmentContainer	(NC) Equipment container that is affected by the availability given by this availability container.
0..*	AvailabilityGroup	0..1	<a href="#">AvailabilityGroup</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
1..*	AvailabilitySchedule	1..1	<a href="#">AvailabilitySchedule</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1840

### 1841 3.5.4 (NC) AvailabilityEquipment

1842 Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEulIdentifiedObject  
1843 Availability equipment serves for associating an equipment with an availability schedule. For  
1844 instance, putting in or out of service an ACLineSegment in combination with other availability  
1845 functions with the same availability schedule.

1846 Table 57 shows all attributes of AvailabilityEquipment.

1847 **Table 57 – Attributes of ExtAvailabilitySchedule::AvailabilityEquipment**

name	mult	type	description
kind	0..1	<a href="#">AvailabilityFunctionKind</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1848  
1849

Table 58 shows all association ends of AvailabilityEquipment with other classes.

1850 **Table 58 – Association ends of ExtAvailabilitySchedule::AvailabilityEquipment with**  
1851 **other classes**

mult from	name	mult to	type	description
0..*	Equipment	0..1	Equipment	(NC) Equipment that is affected by the availability given by this availability equipment.
0..*	AvailabilityGroup	0..1	<a href="#">AvailabilityGroup</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
1..*	AvailabilitySchedule	1..1	<a href="#">AvailabilitySchedule</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1852

### 1853 3.5.5 (NC) AvailabilityExceptionallimit

1854 Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEulIdentifiedObject  
1855 Availability exceptional limit serves for associating an operational limit restriction with an  
1856 availability schedule. For instance, enabling or disabling the current limit on ACLineSegment  
1857 terminal in combination with other availability functions with the same availability schedule or  
1858 de-rating due to fault.

1859 Table 59 shows all attributes of AvailabilityExceptionallimit.

1860 **Table 59 – Attributes of ExtAvailabilitySchedule::AvailabilityExceptionallimit**

name	mult	type	description
value	0..1	Float	(NC) Value for the referred operational limit.
kind	0..1	<a href="#">AvailabilityFunctionKind</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1861

1862 Table 60 shows all association ends of AvailabilityExceptionallimit with other classes.

1863 **Table 60 – Association ends of ExtAvailabilitySchedule::AvailabilityExceptionallimit**  
1864 **with other classes**

mult from	name	mult to	type	description
0..*	OperationalLimit	0..1	OperationalLimit	(NC) Operational limit that is constrained by this availability exceptional limit.
0..*	AvailabilityGroup	0..1	<a href="#">AvailabilityGroup</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
1..*	AvailabilitySchedule	1..1	<a href="#">AvailabilitySchedule</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1865

1866 **3.5.6 (NC) AvailabilityGroup**

1867 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

1868 Container to link relevant equipment that is affected by (un)availability schedule across

1869 availability coordinator (e.g. TSO-TSO, TSO-DSO or DSO-DSO).

1870 Table 61 shows all attributes of AvailabilityGroup.

1871

**Table 61 – Attributes of ExtAvailabilitySchedule::AvailabilityGroup**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1872

1873 Table 62 shows all association ends of AvailabilityGroup with other classes.

1874 **Table 62 – Association ends of ExtAvailabilitySchedule::AvailabilityGroup with other**  
1875 **classes**

mult from	name	mult to	type	description
0..1	AvailabilityPowerSystem Function	0..*	<a href="#">AvailabilityPowerSystem Function</a>	(NC) All availability power system functions linked through mutual dependency with other availability power system functions controlled by other system operators.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1876

1877 **3.5.7 (NC) AvailabilityPowerSystemFunction**

1878 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

1879 Availability power system function describes the power system function that has a non-normal  
 1880 availability in the associated availability schedule. The availability of the function is needed as  
 1881 part of a power flow solution. This function is the cause and not the effect of the availability, if  
 1882 the effect can be calculated through power flow. For instance if only the step-up transformer for  
 1883 a generator is not available, the power flow will calculate that the generator is de-energized  
 1884 (outage). If both are tagged as not available it will not be possible to investigate remedial action  
 1885 for connecting the generator. It is expected that the power flow function is able to perform simple

1886 topology changes affected by a function taken out of service, e.g. open switches on both end  
1887 of a ACLineSegment when the ACLineSegment is taken out of service. More complex changes,  
1888 like change regulation set point, must be described in the linked GridStateAlterationCollection.  
1889 Table 63 shows all attributes of AvailabilityPowerSystemFunction.

1890 **Table 63 – Attributes of ExtAvailabilitySchedule::AvailabilityPowerSystemFunction**

name	mult	type	description
kind	0..1	<a href="#">AvailabilityFunctionKind</a>	(NC) Kind of availability that affect the power system function.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

1891  
1892 Table 64 shows all association ends of AvailabilityPowerSystemFunction with other classes.

1893 **Table 64 – Association ends of**  
1894 **ExtAvailabilitySchedule::AvailabilityPowerSystemFunction with other classes**

mult from	name	mult to	type	description
0..*	AvailabilityGroup	0..1	<a href="#">AvailabilityGroup</a>	(NC) Grouping for all availability power system functions (controlled by all relevant system operators) that have the same availability schedule.
1..*	AvailabilitySchedule	1..1	<a href="#">AvailabilitySchedule</a>	(NC) Availability schedule for this availability power system function.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1895  
1896 **3.5.8 (NC) AvailabilityRemedialActionScheme**

1897 Inheritance path = [AvailabilityPowerSystemFunction](#) : IdentifiedObject : ExtEuIdentifiedObject  
1898 Availability remedial action scheme serves for associating a remedial action scheme with an  
1899 availability schedule. For instance, taking in or out of service a SIPS / SPS due to  
1900 communication issue, in combination with other availability functions with the same availability  
1901 schedule.

1902 Table 65 shows all attributes of AvailabilityRemedialActionScheme.

1903 **Table 65 – Attributes of ExtAvailabilitySchedule::AvailabilityRemedialActionScheme**

name	mult	type	description
kind	0..1	<a href="#">AvailabilityFunctionKind</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1904

1905

Table 66 shows all association ends of AvailabilityRemedialActionScheme with other classes.

1906

1907

**Table 66 – Association ends of  
ExtAvailabilitySchedule::AvailabilityRemedialActionScheme with other classes**

mult from	name	mult to	type	description
0..*	RemedialActionScheme	0..1	<a href="#">RemedialActionScheme</a>	(NC) Remedial action scheme that is affected by the availability given by this availability remedial action scheme.
0..*	AvailabilityGroup	0..1	<a href="#">AvailabilityGroup</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
1..*	AvailabilitySchedule	1..1	<a href="#">AvailabilitySchedule</a>	(NC) inherited from: <a href="#">AvailabilityPowerSystemFunction</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1908

1909

### 3.5.9 (NC) AvailabilitySchedule

1910

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

1911

A given (un)availability schedule with a given status and cause that include multiple equipment that need to follow the same scheduling periods.

1912

1913

Table 67 shows all attributes of AvailabilitySchedule.

1914

**Table 67 – Attributes of ExtAvailabilitySchedule::AvailabilitySchedule**

name	mult	type	description
cancelledDateTime	0..1	DateTime	(NC) The date and time the (un)availability schedule were cancelled .
causeDescription	0..1	String	(NC) A cause description for a cause kind. In case of CauseKind equals other, description or a reference of the cause of the (un)availability schedule.
causeKind	0..1	<a href="#">AvailabilityScheduleCauseKind</a>	(NC) Kind of cause for the availability schedule.
daytimeRestitutionDuration	0..1	Duration	(NC) The time required to take the out-of-service equipment back into service during daytime. This includes the start-up time for generating units.
eveningRestitutionDuration	0..1	Duration	(NC) The time required to take the out-of-service equipment back into service after office hours. This includes the start-up time for generating units.
maxRestitutionDuration	0..1	Duration	(NC) The maximum time required to take the out-of-service equipment back into service. This includes the start-up time for generating units.
priority	0..1	Integer	(NC) Value 0 means ignore priority. 1 means the highest priority, 2 is the second highest priority.

name	mult	type	description
weekendRestitutionDuration	0..1	Duration	(NC) The time required to take the out-of-service equipment back into service in the weekend or during bank holidays. This includes the start-up time for generating units.
isCancelled	0..1	Boolean	(NC) Defines the cancelling of the availability schedule. True means that is cancelling, False means that it is not cancelling.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1915  
1916  
1917  
1918

Table 68 shows all association ends of AvailabilitySchedule with other classes.

**Table 68 – Association ends of ExtAvailabilitySchedule::AvailabilitySchedule with other classes**

mult from	name	mult to	type	description
1..1	AvailabilityPowerSystemFunction	1..*	<a href="#">AvailabilityPowerSystemFunction</a>	(NC) All the couplings that associate one concrete function (e.g., equipment or container, SIPS/SPSS, grid state alteration, exceptional operational limits) with the same availability schedule.
0..*	RemedialAction	0..1	<a href="#">AvailabilityRemedialAction</a>	(NC) Remedial action that is cancelling this availability schedule.
0..1	ActualSchedule	0..1	<a href="#">EventSchedule</a>	(NC) Actual schedule that relates to this availability schedule; used for ex-post reporting and analysis (e.g., to compare planned vs. actual).
0..1	PlannedSchedule	0..1	<a href="#">EventSchedule</a>	(NC) Planned schedule that relates to this availability schedule used for planning availability (e.g., to compare planned vs. actual).
0..*	DependentOnSchedule	0..1	<a href="#">AvailabilitySchedule</a>	(NC) (Un)availability schedule requested by one operator may require another operator to request their (un)availability schedule. This association is linking the schedules so that the dependency is clear.
0..1	AlternativeSchedule	0..*	<a href="#">AvailabilitySchedule</a>	(NC) Alternative schedule. The priority in regards to multiple alternatives is given by the priority attribute. This schedule is only relevant if all the alternatives with higher priority are cancelled.
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) The grid state alteration collection that has this availability schedule.
0..1	PowerSystemProject	0..1	<a href="#">PowerSystemProject</a>	(NC) The power system project that has this availability schedule.
0..1	AvailabilitySchedule	0..*	<a href="#">AvailabilitySchedule</a>	(NC) Availability schedule that has a dependent availability schedule.
0..*	PrioritySchedule	0..1	<a href="#">AvailabilitySchedule</a>	(NC) Priority schedule. This is the schedule that has the highest priority and the only valid if not cancelled.

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1919

1920 **3.5.10 (NC) AvailabilityFunctionKind enumeration**

1921 Kind of availability that is affecting the function.

1922 Table 69 shows all literals of AvailabilityFunctionKind.

1923 **Table 69 – Literals of ExtAvailabilitySchedule::AvailabilityFunctionKind**

literal	value	description
inService		Function is in service.
outOfService		Function is out-of-service.
underTesting		Function is under testing and need to expect unscheduled availability.

1924

1925 **3.5.11 (NC) AvailabilityScheduleCauseKind enumeration**

1926 The kinds of cause of the (un)availability schedule.

1927 Table 70 shows all literals of AvailabilityScheduleCauseKind.

1928 **Table 70 – Literals of ExtAvailabilitySchedule::AvailabilityScheduleCauseKind**

literal	value	description
commissioning		The cause is due to a commissioning.
decommissioning		The cause is due to a decommissioning.
functionalControl		The cause is due to a functional control (in & out).
environmentalCondition		The cause is due to an environmental condition. This can lead to exceptional margin and limits.
maintenance		The cause is due to a maintenance.
refurbishment		The cause is due to a refurbishment, either upgrade or downgrade.
worksInProximity		The cause is due to a works in proximity.
other		The cause is of other kind.

1929

1930 **3.6 Package ExtCIM18**1931 **3.6.1 General**

1932

1933 **3.6.2 (NC) VoltageAngleLimit**

1934 Inheritance path = OperationalLimit : IdentifiedObject : ExtEulIdentifiedObject

1935 Voltage angle limit between two terminals. The association end OperationalLimitSet.Terminal

1936 defines one end and the host of the limit. The association end

1937 VoltageAngleLimit.AngleReferenceTerminal defines the reference terminal.

1938 Table 71 shows all attributes of VoltageAngleLimit.

1939

**Table 71 – Attributes of ExtCIM18::VoltageAngleLimit**

name	mult	type	description
value	0..1	AngleDegrees	(NC) The difference in angle degrees between referenced by the association end OperationalLimitSet.Terminal and the Terminal referenced by the association end VoltageAngleLimit.AngleReferenceTerminal. The value shall be positive (greater than zero).
normalValue	0..1	AngleDegrees	(NC) The difference in angle degrees between referenced by the association end OperationalLimitSet.Terminal and the Terminal referenced by the association end VoltageAngleLimit.AngleReferenceTerminal. The value shall be positive (greater than zero).
isFlowToRefTerminal	0..1	Boolean	(NC) True if the flow is from the operating limit terminal to the angle reference terminal. False means that the flow is the other direction. When it is not given, the limit is the same for both directions.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1940

1941

Table 72 shows all association ends of VoltageAngleLimit with other classes.

1942

**Table 72 – Association ends of ExtCIM18::VoltageAngleLimit with other classes**

mult from	name	mult to	type	description
0..*	AngleReferenceTerminal	0..1	Terminal	(NC) The angle reference terminal for the voltage angle limit.
0..1	VoltageAngleSchedule	0..*	<a href="#">VoltageAngleSchedule</a>	(NC) Voltage angle schedule associated with a voltage angle limit.
0..*	OperationalLimitSet	1..1	OperationalLimitSet	inherited from: OperationalLimit
0..*	OperationalLimitType	0..1	OperationalLimitType	inherited from: OperationalLimit
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1943

1944

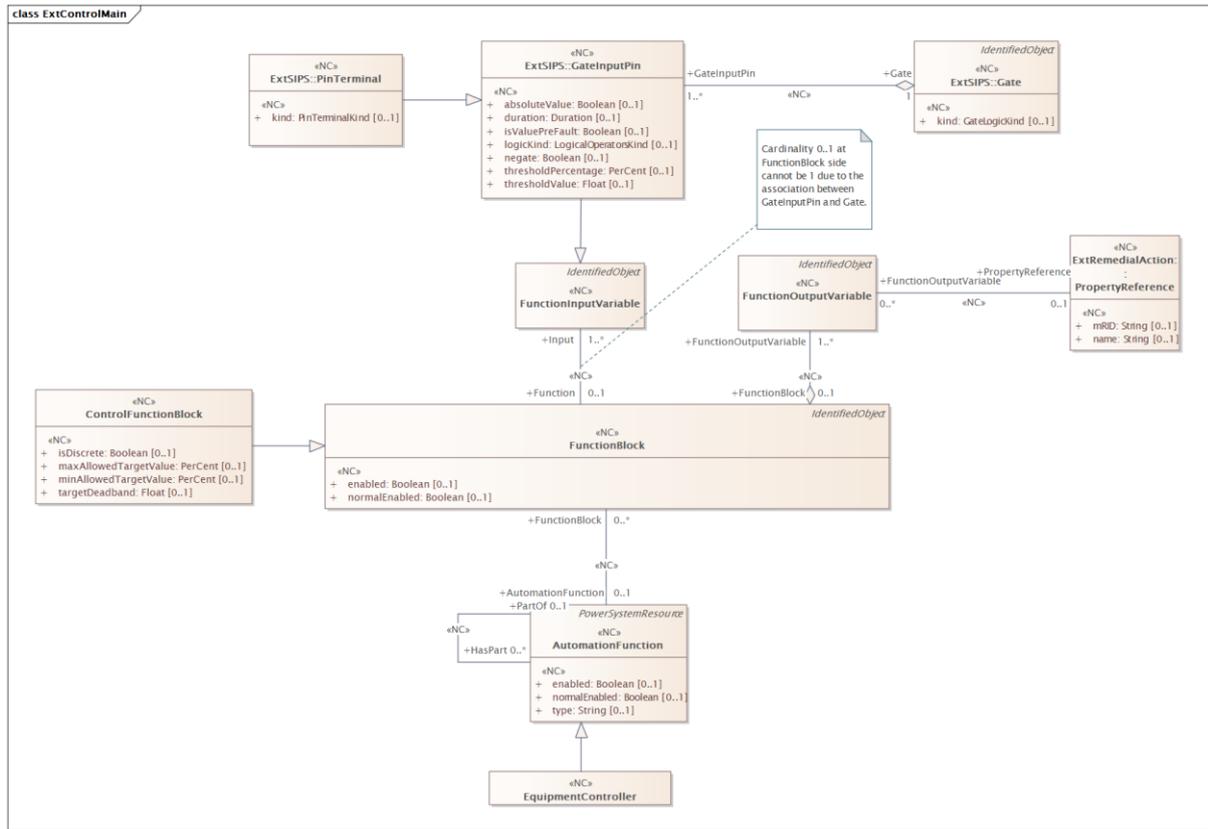
**3.6.3 Package ExtControl**

1945

**3.6.3.1 General**

1946

The package contains extensions related to control.



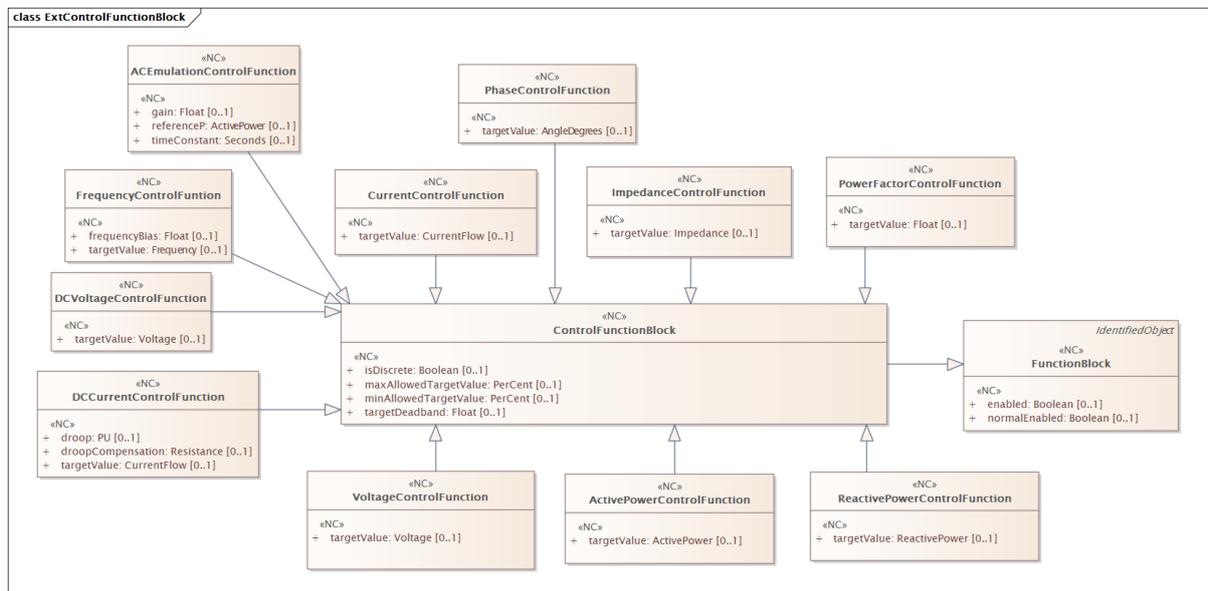
1947

1948

**Figure 6 – Class diagram ExtControl::ExtControlMain**

1949

Figure 6: The diagram contains main classes and associations related to control.



1950

1951

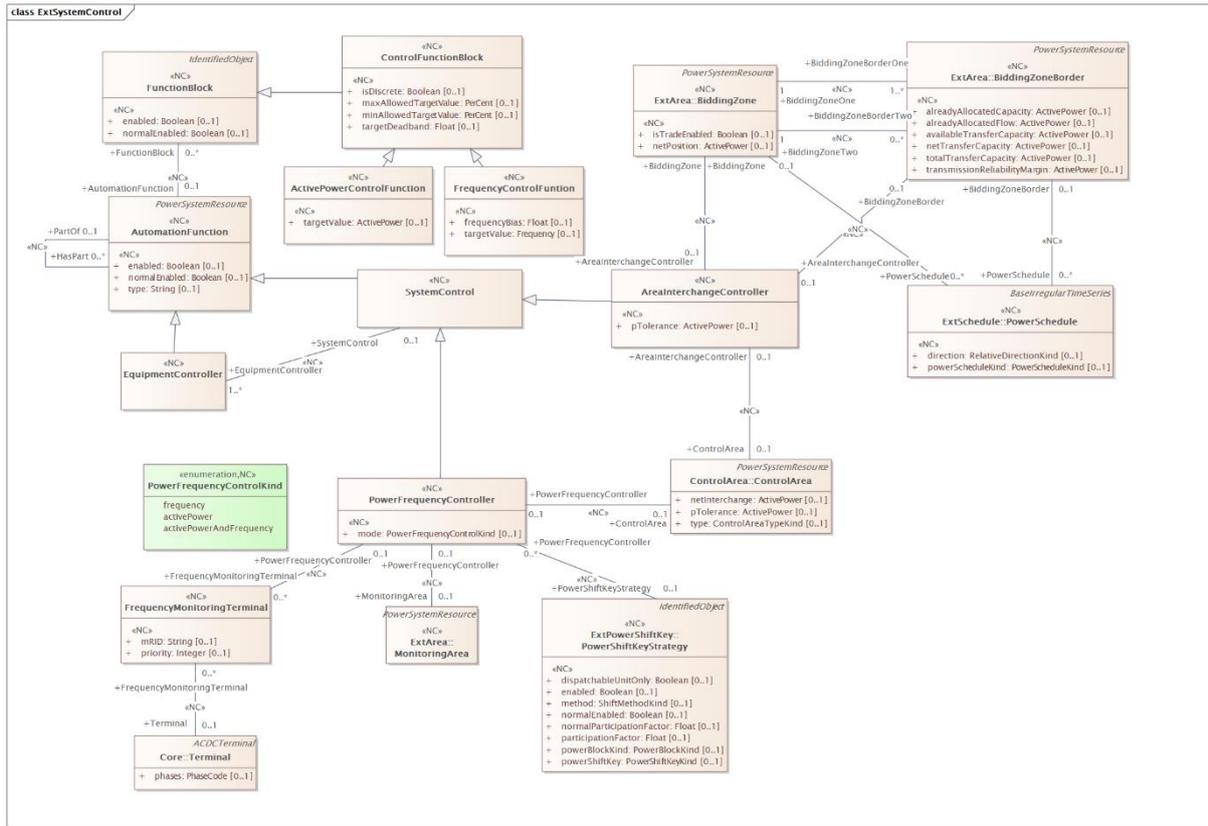
**Figure 7 – Class diagram ExtControl::ExtControlFunctionBlock**

1952

Figure 7: The diagram contains classes and association related to control function block.







1962

1963

**Figure 11 – Class diagram ExtControl::ExtSystemControl**

1964

Figure 11: The diagram contains classes related to integrated AC and DC system control.

1965

**3.6.3.2 (NC) ActivePowerControlFunction**

1966

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject

1967

Active power control function is a function block that calculates operating point of the controlled equipment to achieve the target active power.

1968

Table 73 shows all attributes of ActivePowerControlFunction.

1969

1970

**Table 73 – Attributes of ExtControl::ActivePowerControlFunction**

name	mult	type	description
targetValue	0..1	ActivePower	(NC) Target value for the active power that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1972  
1973 Table 74 shows all association ends of ActivePowerControlFunction with other classes.

**Table 74 – Association ends of ExtControl::ActivePowerControlFunction with other classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAct ion	0..*	<a href="#">ControlFunctionBlockAct ion</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedul e	0..*	<a href="#">GenericEnablingSchedul e</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1976  
1977 **3.6.3.3 (NC) AutomationFunction**

1978 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject  
1979 Automation function is a collection of functional block or other automation function that can be  
1980 executed as a work cycle program as part of an automated system.

1981 Table 75 shows all attributes of AutomationFunction.

**Table 75 – Attributes of ExtControl::AutomationFunction**

name	mult	type	description
enabled	0..1	Boolean	(NC) True, if the automation function is enabled (active). Otherwise false.
type	0..1	String	(NC) Type of automation function.
normalEnabled	0..1	Boolean	(NC) True, if the automation function is enabled (active). Otherwise false.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1983  
1984 Table 76 shows all association ends of AutomationFunction with other classes.

1985 **Table 76 – Association ends of ExtControl::AutomationFunction with other classes**

mult from	name	mult to	type	description
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) Automation block group which belongs to an automation function.
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) Enabling schedule associated to an automation function.
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) Automation function has this automation function as a part.
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) Function block is part of this automation function.
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) Automation function is part of this automation function.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1986

1987 **3.6.3.4 (NC) CompensatorController**1988 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :

1989 IdentifiedObject : ExtEulIdentifiedObject

1990 Compensator controller is controlling the equipment to optimize the use of the compensators.

1991 Table 77 shows all attributes of CompensatorController.

1992

**Table 77 – Attributes of ExtControl::CompensatorController**

name	mult	type	description
mode	0..1	<a href="#">CompensatorControlModeKind</a>	(NC) Mode of the compensator controller.
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

1993

1994 Table 78 shows all association ends of CompensatorController with other classes.

1995 **Table 78 – Association ends of ExtControl::CompensatorController with other classes**

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

1996

1997 **3.6.3.5 (NC) ControlFunctionBlock**1998 Inheritance path = [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject

1999 Control function block is a function block that contains an algorithm for controlling the equipment.

2000 Table 79 shows all attributes of ControlFunctionBlock.

2002

**Table 79 – Attributes of ExtControl::ControlFunctionBlock**

name	mult	type	description
isDiscrete	0..1	Boolean	(NC) True, if the control function is discrete. This applies to equipment with discrete controls, e.g. tap changers and shunt compensators.
targetDeadband	0..1	Float	(NC) Target deadband is used with discrete control to avoid excessive update of controls like tap changers and shunt compensator banks while regulating. The attribute shall be a positive value or zero. If isDiscrete is set to "false", the targetDeadband is to be ignored. Note that for instance, if the targetValue is 100 kV and the targetDeadband is 2 kV the range is from 99 to 101 kV.
maxAllowedTargetValue	0..1	PerCent	(NC) Maximum allowed target value given by the percent of target value. The allowed value range is [0,100].
minAllowedTargetValue	0..1	PerCent	(NC) Minimum allowed target value given by the percent of target value.

name	mult	type	description
			The allowed value range is [0,100].
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2003

2004

Table 80 shows all association ends of ControlFunctionBlock with other classes.

2005

**Table 80 – Association ends of ExtControl::ControlFunctionBlock with other classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	<a href="#">ControlFunctionBlockAction</a>	(NC) The action that is applied to this control function block.
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2006

2007

### 3.6.3.6 (NC) DirectCurrentMasterController

2008

Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :

2009

[AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2010

Direct current system control is a control system which governs the operation of an entire DC

2011

system consisting of more than one DC substation and performs those functions of controlling,

2012

monitoring and protection which require information from more than one substation. This can

2013

also be a multiterminal control which is a DC system control for more than two DC substations

2014

or a DC master control, which is a general concept for control coordination of a DC system. The

2015

DC master control may be implemented at the bipole and/or pole level as defined in IEC 60633.

2016

The DC system control/multiterminal control/master control is part of the hierarchical structure

2017

of an HVDC control system that has an integrated AC/DC system control as the highest level

2018

of control which governs the integrated operation of AC and DC systems of a power system.

2019

This control system is under the responsibility of the system operator.

2020

Table 81 shows all attributes of DirectCurrentMasterController.

2021

**Table 81 – Attributes of ExtControl::DirectCurrentMasterController**

name	mult	type	description
mode	0..1	<a href="#">DCControlModeKind</a>	(NC) inherited from: <a href="#">DirectCurrentEquipmentController</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2022

2023

Table 82 shows all association ends of DirectCurrentMasterController with other classes.

2024

2025

**Table 82 – Association ends of ExtControl::DirectCurrentMasterController with other classes**

mult from	name	mult to	type	description
0..1	DCTieCorridor	0..1	<a href="#">DCTieCorridor</a>	(NC) DCTieCorridor controlled by this direct current master controller.
0..1	DirectCurrentPoleController	0..*	<a href="#">DirectCurrentPoleController</a>	(NC) DC pole controller that is controlled by this DC master controller.
0..1	DirectCurrentSubstationController	2..*	<a href="#">DirectCurrentSubstationController</a>	(NC) DC substation controller controlled by a multiterminal control.
0..1	DirectCurrentBipoleController	0..*	<a href="#">DirectCurrentBipoleController</a>	(NC) Direct current bipole controller which belongs to a direct current master controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2026

2027 **3.6.3.7 (NC) EquipmentController**2028 Inheritance path = [AutomationFunction](#) : PowerSystemResource : IdentifiedObject :  
2029 ExtEulIdentifiedObject2030 Equipment controller is an automation function that can control one or multiple equipment  
2031 function to achieve all the targets inside the given tolerance.

2032 Table 83 shows all attributes of EquipmentController.

2033

**Table 83 – Attributes of ExtControl::EquipmentController**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2034

2035 Table 84 shows all association ends of EquipmentController with other classes.

2036

**Table 84 – Association ends of ExtControl::EquipmentController with other classes**

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) All regulating conducting equipment that belongs to this equipment controller.
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) Equipment controller action for this equipment controller.
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) System control which controls this equipment controller.
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2037

2038 **3.6.3.8 (NC) ScheduleResourceController**2039 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :

2040 IdentifiedObject : ExtEulIdentifiedObject

2041 Schedule resource controller is controlling the equipment to optimize the schedule resource.

2042 Table 85 shows all attributes of ScheduleResourceController.

2043

**Table 85 – Attributes of ExtControl::ScheduleResourceController**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2044

2045 Table 86 shows all association ends of ScheduleResourceController with other classes.

**Table 86 – Association ends of ExtControl::ScheduleResourceController with other classes**

2046

2047

mult from	name	mult to	type	description
0..1	ScheduleResource	0..1	<a href="#">ScheduleResource</a>	(NC) Schedule resource that has a schedule resource controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2048

2049 **3.6.3.9 (NC) FunctionBlock**

2050 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

2051 Function block is a function described as a set of elementary blocks. The blocks describe the function between input variables and output variables.

2052 Table 87 shows all attributes of FunctionBlock.

2054

**Table 87 – Attributes of ExtControl::FunctionBlock**

name	mult	type	description
enabled	0..1	Boolean	(NC) True, if the function block is enabled (active). Otherwise false.
normalEnabled	0..1	Boolean	(NC) True, if the function block is enabled (active). Otherwise false.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2055

2056 Table 88 shows all association ends of FunctionBlock with other classes.

2057

**Table 88 – Association ends of ExtControl::FunctionBlock with other classes**

mult from	name	mult to	type	description
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) Automation function describe automation that this function block is part of.
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) Enabling schedule associated to a function block.
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) Function input variable describe the input or domain to the function block.
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) Function output variable describe the output or codomain to the function block.
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) Automation block group which has function blocks.

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2058

2059 **3.6.3.10 (NC) FunctionInputVariable**

2060 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

2061 Functional input variable defines the domain of the function.

2062 Table 89 shows all attributes of FunctionInputVariable.

2063

**Table 89 – Attributes of ExtControl::FunctionInputVariable**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2064

2065 Table 90 shows all association ends of FunctionInputVariable with other classes.

2066

**Table 90 – Association ends of ExtControl::FunctionInputVariable with other classes**

mult from	name	mult to	type	description
1..*	Function	0..1	<a href="#">FunctionBlock</a>	(NC) Function block describe the function that function input variable provides the domain for.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2067

2068 **3.6.3.11 (NC) FunctionOutputVariable**

2069 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

2070 Functional output variable defines the codomain of the function.

2071 Table 91 shows all attributes of FunctionOutputVariable.

2072

**Table 91 – Attributes of ExtControl::FunctionOutputVariable**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2073

2074 Table 92 shows all association ends of FunctionOutputVariable with other classes.

2075 **Table 92 – Association ends of ExtControl::FunctionOutputVariable with other classes**

mult from	name	mult to	type	description
1..*	FunctionBlock	0..1	<a href="#">FunctionBlock</a>	(NC) Function block describe the function that function output variable provides the codomain for.
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) Property reference refers to a given class and property that is populated by the function output variable.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2076

2077 **3.6.3.12 (NC) ImpedanceControlFunction**2078 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :  
2079 ExtEulIdentifiedObject2080 Impedance control function is a function block that calculates the operating point of the  
2081 controlled equipment to achieve the target impedance.

2082 Table 93 shows all attributes of ImpedanceControlFunction.

2083 **Table 93 – Attributes of ExtControl::ImpedanceControlFunction**

name	mult	type	description
targetValue	0..1	Impedance	(NC) Target value for the impedance that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2084

2085 Table 94 shows all association ends of ImpedanceControlFunction with other classes.

2086 **Table 94 – Association ends of ExtControl::ImpedanceControlFunction with other**  
2087 **classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAct ion	0..*	<a href="#">ControlFunctionBlockAct ion</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedul e	0..*	<a href="#">GenericEnablingSchedul e</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2088

### 2089 3.6.3.13 (NC) PowerFactorControlFunction

2090 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :  
2091 ExtEulIdentifiedObject

2092 Power factor control function is a function block that calculates the operating point of the  
2093 controlled equipment to achieve the target power factor.

2094 Table 95 shows all attributes of PowerFactorControlFunction.

2095 **Table 95 – Attributes of ExtControl::PowerFactorControlFunction**

name	mult	type	description
targetValue	0..1	Float	(NC) Target value for the power factor that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2096

2097 Table 96 shows all association ends of PowerFactorControlFunction with other classes.

2098  
2099**Table 96 – Association ends of ExtControl::PowerFactorControlFunction with other classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	<a href="#">ControlFunctionBlockAction</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2100

**3.6.3.14 (NC) PowerPlantController**

2102 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :  
2103 IdentifiedObject : ExtEulIdentifiedObject

2104 Power plant controller is controlling the equipment of a power plant.

2105 Table 97 shows all attributes of PowerPlantController.

2106

**Table 97 – Attributes of ExtControl::PowerPlantController**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2107

2108 Table 98 shows all association ends of PowerPlantController with other classes.

**Table 98 – Association ends of ExtControl::PowerPlantController with other classes**

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>

2109

mult from	name	mult to	type	description
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2110

2111 **3.6.3.15 (NC) ReactivePowerControlFunction**

2112 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :  
2113 ExtEulIdentifiedObject

2114 Reactive power control function is a function block that calculate the operating point of the  
2115 controlled equipment to achieve the target reactive power.

2116 Table 99 shows all attributes of ReactivePowerControlFunction.

2117

**Table 99 – Attributes of ExtControl::ReactivePowerControlFunction**

name	mult	type	description
targetValue	0..1	ReactivePower	(NC) Target value for the reactive power that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2118

2119 Table 100 shows all association ends of ReactivePowerControlFunction with other classes.

2120 **Table 100 – Association ends of ExtControl::ReactivePowerControlFunction with other**  
2121 **classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	<a href="#">ControlFunctionBlockAction</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2122

### 2123 3.6.3.16 (NC) StaticSynchronousSeriesCompensator

2124 Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :  
2125 ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :  
2126 ExtEulIdentifiedObject

2127 Static synchronous series compensator (SSSC) is a type of flexible AC transmission system  
2128 which consists of a solid-state voltage source inverter coupled with a transformer that is  
2129 connected in series with a transmission line. This device can inject an almost sinusoidal voltage  
2130 in series with the line. This injected voltage could be considered as an inductive or capacitive  
2131 reactance, which is connected in series with the transmission line. This feature can provide  
2132 controllable voltage compensation. In addition, SSSC is able to reverse the power flow by  
2133 injecting a sufficiently large series reactive compensating voltage. Moreover it can inject a  
2134 voltage proportional to the difference between the line current and the pre-configured current  
2135 threshold. It shall have two Terminal-s associated with it.

2136 Table 101 shows all attributes of StaticSynchronousSeriesCompensator.

2137 **Table 101 – Attributes of ExtControl::StaticSynchronousSeriesCompensator**

name	mult	type	description
slope	0..1	VoltagePerReactivePower	(NC) inherited from: <a href="#">FACTSEquipment</a>
q	0..1	ReactivePower	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedI	0..1	CurrentFlow	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedU	0..1	Voltage	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
minC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
maxC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
minL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
maxL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
controlEnabled	0..1	Boolean	inherited from: RegulatingCondEq

name	mult	type	description
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2138  
2139  
2140

Table 102 shows all association ends of StaticSynchronousSeriesCompensator with other classes.

2141  
2142

**Table 102 – Association ends of ExtControl::StaticSynchronousSeriesCompensator with other classes**

mult from	name	mult to	type	description
0..1	LossCurve	0..*	<a href="#">LossCurve</a>	(NC) inherited from: <a href="#">FACTSEquipment</a>
0..*	RegulatingControl	0..1	RegulatingControl	inherited from: RegulatingCondEq
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2143

2144 **3.6.3.17 (NC) SubstationController**2145 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :  
2146 IdentifiedObject : ExtEulIdentifiedObject2147 Substation controller is controlling the equipment to optimize the use of the controlling  
2148 equipment within a substation.

2149 Table 103 shows all attributes of SubstationController.

2150

**Table 103 – Attributes of ExtControl::SubstationController**

name	mult	type	description
mode	0..1	<a href="#">SubstationControllerModeKind</a>	(NC) Mode of the substation controller.
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2151

2152 Table 104 shows all association ends of SubstationController with other classes.

2153

**Table 104 – Association ends of ExtControl::SubstationController with other classes**

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

mult from	name	mult to	type	description
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2154

2155 **3.6.3.18 (NC) TapChangerController**2156 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :  
2157 IdentifiedObject : ExtEulIdentifiedObject2158 Tap changer controller is an equipment controller that controls a tap changer, e.g. how the  
2159 voltage at the end of a line varies with the load level and compensation of the voltage drop by  
2160 tap adjustment.

2161 Table 105 shows all attributes of TapChangerController.

2162

**Table 105 – Attributes of ExtControl::TapChangerController**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2163

2164 Table 106 shows all association ends of TapChangerController with other classes.

2165 **Table 106 – Association ends of ExtControl::TapChangerController with other classes**

mult from	name	mult to	type	description
0..1	TapChanger	0..*	TapChanger	(NC) All tap changers controlled by this controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource

mult from	name	mult to	type	description
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2166

2167 **3.6.3.19 (NC) UnifiedPowerFlowController**

2168 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :  
2169 IdentifiedObject : ExtEulIdentifiedObject

2170 Unified power flow controller (UPFC) is providing fast-acting reactive power compensation on  
2171 high-voltage electricity transmission networks.

2172 Table 107 shows all attributes of UnifiedPowerFlowController.

2173

**Table 107 – Attributes of ExtControl::UnifiedPowerFlowController**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2174

2175 Table 108 shows all association ends of UnifiedPowerFlowController with other classes.

**Table 108 – Association ends of ExtControl::UnifiedPowerFlowController with other classes**

2176

2177

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2178

2179 **3.6.3.20 (NC) VoltageControlFunction**

2180 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :  
2181 ExtEulIdentifiedObject

2182 Voltage control function is a function block that calculate the operating point of the controlled  
2183 equipment to achieve the target voltage.

2184 Table 109 shows all attributes of VoltageControlFunction.

2185

**Table 109 – Attributes of ExtControl::VoltageControlFunction**

name	mult	type	description
targetValue	0..1	Voltage	(NC) Target value for the voltage that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2186

2187 Table 110 shows all association ends of VoltageControlFunction with other classes.

2188 **Table 110 – Association ends of ExtControl::VoltageControlFunction with other classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAct ion	0..*	<a href="#">ControlFunctionBlockAct ion</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>

mult from	name	mult to	type	description
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2189

2190 **3.6.3.21 (NC) CompensatorControlModeKind enumeration**

2191 Kind of compensator controller mode.

2192 Table 111 shows all literals of CompensatorControlModeKind.

2193 **Table 111 – Literals of ExtControl::CompensatorControlModeKind**

literal	value	description
reactivePower		Reactive power control.
voltage		Voltage control.

2194

2195 **3.6.3.22 (NC) SubstationControllerModeKind enumeration**

2196 Kind of substation controller mode.

2197 Table 112 shows all literals of SubstationControllerModeKind.

2198 **Table 112 – Literals of ExtControl::SubstationControllerModeKind**

literal	value	description
reactivePower		Reactive power control is the primary control of the substation.
voltage		Voltage control is the primary control of the substation.
activePower		Active power control is the primary control of the substation..

2199

2200 **3.6.3.23 (NC) FrequencyControlFuntion**2201 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :  
2202 ExtEulIdentifiedObject2203 Frequency control function is a function block that calculate the operating point of the controlled  
2204 equipment to achieve the target frequency.

2205 Table 113 shows all attributes of FrequencyControlFuntion.

2206 **Table 113 – Attributes of ExtControl::FrequencyControlFuntion**

name	mult	type	description
targetValue	0..1	Frequency	(NC) Target value for the frequency that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.

name	mult	type	description
frequencyBias	0..1	Float	(NC) Target value for the active power that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 114 shows all association ends of FrequencyControlFunction with other classes.

**Table 114 – Association ends of ExtControl::FrequencyControlFunction with other classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	<a href="#">ControlFunctionBlockAction</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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### 3.6.3.24 (NC) ACEmulationControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject

The AC emulation control function is used when AC emulation model is activated for a DC system. It consists in computing the active power set point of the DC system as a function of the voltage angle difference between both points of common coupling with the AC network in order to mimic the behavior of an AC transmission line. This control mode enables the automatic adjustment of the active power reference following variations of the AC system operational point.

The setpoint of the DC system is calculated by  $P_{setpoint} = P_{ref} + K_{dc} * (\text{angle1} - \text{angle2})$ , where

- 2222 - Pref is the existing active power setpoint;  
 2223 - Kdc is the control system gain and  
 2224 - angle1 and angle2 are the phase angle measurement (measured at points of common coupling with the AC network) respectively at the side 1 and 2 of the DC system.  
 2225 Table 115 shows all attributes of ACEmulationControlFunction.  
 2226

2227 **Table 115 – Attributes of ExtControl::ACEmulationControlFunction**

name	mult	type	description
referenceP	0..1	ActivePower	(NC) Existing active power setpoint used to calculate the active power setpoint of the AC emulation control.
gain	0..1	Float	(NC) Control system gain in AC transmission emulation control measured in MW/deg. It plays the role of an admittance of the equivalent AC transmission line that the control is emulating the higher is the gain the higher is the active power transfer at steady state.
timeConstant	0..1	Seconds	(NC) Control system time constant in AC transmission emulation control. It affects the time needed to reach a new steady state equilibrium point after a network perturbation extremely important to guarantee N-1 relief related to an interconnection. The higher is time constant the slower is the DC system dynamic.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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2229 Table 116 shows all association ends of ACEmulationControlFunction with other classes.

2230 **Table 116 – Association ends of ExtControl::ACEmulationControlFunction with other classes**  
 2231

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAct ion	0..*	<a href="#">ControlFunctionBlockAct ion</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedul e	0..*	<a href="#">GenericEnablingSchedul e</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>

mult from	name	mult to	type	description
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2232

2233 **3.6.3.25 (NC) CurrentControlFunction**

2234 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :  
2235 ExtEulIdentifiedObject

2236 Current control function is a function block that calculates the operating point of the controlled  
2237 equipment to achieve the target current.

2238 Table 117 shows all attributes of CurrentControlFunction.

2239

**Table 117 – Attributes of ExtControl::CurrentControlFunction**

name	mult	type	description
targetValue	0..1	CurrentFlow	(NC) Target value for the current that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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2241 Table 118 shows all association ends of CurrentControlFunction with other classes.

2242

**Table 118 – Association ends of ExtControl::CurrentControlFunction with other classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	<a href="#">ControlFunctionBlockAction</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>

mult from	name	mult to	type	description
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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2244 **3.6.3.26 (NC) DCControlModeKind enumeration**

2245 Kind of DC control mode.

2246 Table 119 shows all literals of DCControlModeKind.

2247

**Table 119 – Literals of ExtControl::DCControlModeKind**

literal	value	description
activePower		Control is active power control at AC side, at point of common coupling. According to IEC 60633 the active power control mode is control of the active power flow exchanged between a DC substation and the connected AC network.
dcVoltage		Control is DC voltage in a DC substation (IEC 60633).
dcCurrent		Control is DC current in a DC system (IEC 60633).
reactivePower		Control is reactive power control at AC side, at point of common coupling. According to IEC 60633 reactive power control mode is a control of the reactive power exchanged between a converter unit, or DC substation and the connected AC network.
powerFactorPcc		Control is power factor at point of common coupling.
pulseWidthModulation		No explicit control. Pulse-modulation factor is directly set in magnitude and phase.
pPccAndUdcDroop		Control is active power at point of common coupling and local DC voltage, with the droop.
pPccAndUdcDroopWithCompensation		Control is active power at point of common coupling and compensated DC voltage, with the droop. Compensation factor is the resistance, as an approximation of the DC voltage of a common (real or virtual) node in the DC network.
pPccAndUdcDroopPilot		Control is active power at point of common coupling and the pilot DC voltage, with the droop. The mode is used for Multi Terminal High Voltage DC (MTDC) systems where multiple DC Substations are connected to the DC transmission lines. The pilot voltage is then used to coordinate the control the DC voltage across the DC substations.
phasePcc		Control is phase at point of common coupling.
acEmulation		An AC emulation control aims to reproduce the behaviour of an AC line by means of a function of the difference between angles in both converter stations in DC links embedded within a single synchronous AC grid. For changes in the phase angle on either station, the response of

literal	value	description
		<p>this control is to 'emulate the behaviour of an AC line' in both steady and transient states.</p> <p>The AC emulation control needs measurement signals for the angles at both ends of the DC system (at the AC points of common coupling of the DC system). In practice, the angle difference is measured by built-in devices in the converters and the synchronization of angle measurements on both stations is done by means of GPS.</p> <p>ACEmulationControlFunction is used by this control. The control can only be applied by a controller that have access to the two AC points of common coupling of the DC system. Therefore it cannot be applied for a ACDCConverterController.</p>
frequency		Frequency control mode (IEC 60633) is a control of the frequency of the connected AC network by varying the active power exchanged between a DC substation and the connected AC network.
damping		Damping control mode (IEC 60633) is supplementary control mode providing the damping of power oscillations in one or more connected AC networks.
acVoltage		AC voltage control mode (IEC 60633) is a control of the AC voltage of the AC network connected to a DC substation.
islanded		Islanded network operation mode (IEC 60633) is a control mode in which the DC substation is connected to an islanded AC network.
sstiDamping		Sub-synchronous torsional interaction (SSTI) damping control mode (IEC 60633) is a supplementary control mode providing the damping of critical frequencies of an (electrical) nearby generator.

2248

2249 **3.6.3.27 (NC) PhaseControlFunction**

2250 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :

2251 ExtEulIdentifiedObject

2252 Phase control function is a function block that calculate the operating point of the controlled equipment to achieve the target voltage.

2254 Table 120 shows all attributes of PhaseControlFunction.

2255

**Table 120 – Attributes of ExtControl::PhaseControlFunction**

name	mult	type	description
targetValue	0..1	AngleDegrees	(NC) Target value for the phase that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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2257

Table 121 shows all association ends of PhaseControlFunction with other classes.

2258

**Table 121 – Association ends of ExtControl::PhaseControlFunction with other classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAct ion	0..*	<a href="#">ControlFunctionBlockAct ion</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedul e	0..*	<a href="#">GenericEnablingSchedul e</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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2260

### 3.6.3.28 (NC) DCVoltageControlFunction

2261 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :

2262 ExtEulIdentifiedObject

2263 DC voltage control function is a function block that calculate the operating point of the controlled  
2264 equipment to achieve the target voltage.

2265 Table 122 shows all attributes of DCVoltageControlFunction.

2266

**Table 122 – Attributes of ExtControl::DCVoltageControlFunction**

name	mult	type	description
targetValue	0..1	Voltage	(NC) Target value for the voltage that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 123 shows all association ends of DCVoltageControlFunction with other classes.

2269  
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**Table 123 – Association ends of ExtControl::DCVoltageControlFunction with other classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	<a href="#">ControlFunctionBlockAction</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2271

### 2272 3.6.3.29 (NC) DCCurrentControlFunction

2273 Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject :  
2274 ExtEulIdentifiedObject

2275 DC current control function is a function block that calculates the operating point of the  
2276 controlled equipment to achieve the target current.

2277 Table 124 shows all attributes of DCCurrentControlFunction.

2278

**Table 124 – Attributes of ExtControl::DCCurrentControlFunction**

name	mult	type	description
droop	0..1	PU	(NC) Droop constant. The pu value is obtained as $D [kV/MW] \times S_b / U_{bdc}$ . The attribute shall be a positive value.
droopCompensation	0..1	Resistance	(NC) Compensation constant. Used to compensate for voltage drop when controlling voltage at a distant bus. The attribute shall be a positive value.
targetValue	0..1	CurrentFlow	(NC) Target value for the current that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>

name	mult	type	description
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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2280 Table 125 shows all association ends of DCCurrentControlFunction with other classes.

2281 **Table 125 – Association ends of ExtControl::DCCurrentControlFunction with other**  
2282 **classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAct ion	0..*	<a href="#">ControlFunctionBlockAct ion</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedul e	0..*	<a href="#">GenericEnablingSchedul e</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2283

2284 **3.6.3.30 (NC) TCSCController**2285 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :  
2286 IdentifiedObject : ExtEulIdentifiedObject

2287 TCSC controller is controlling the equipment to optimize the performance of the TCSC.

2288 Table 126 shows all attributes of TCSCController.

2289

**Table 126 – Attributes of ExtControl::TCSCController**

name	mult	type	description
mode	0..1	<a href="#">TCSCControlModeKind</a>	(NC) Mode of the TCSC controller.
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2290

2291

Table 127 shows all association ends of TCSCController with other classes.

2292

**Table 127 – Association ends of ExtControl::TCSCController with other classes**

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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2294

### 3.6.3.31 (NC) TCSCControlModeKind enumeration

2295

Kind of TCSC control mode.

2296

Table 128 shows all literals of TCSCControlModeKind.

2297

**Table 128 – Literals of ExtControl::TCSCControlModeKind**

literal	value	description
activePower		Control is active power.
current		Control is current.
impedance		Control is impedance.

2298

2299

### 3.6.3.32 (NC) RotatingMachineController

2300

Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :

2301

IdentifiedObject : ExtEulIdentifiedObject

2302 Rotating machine controller is controlling the equipment which may be used as a generator or  
2303 motor.

2304 Table 129 shows all attributes of RotatingMachineController.

2305 **Table 129 – Attributes of ExtControl::RotatingMachineController**

name	mult	type	description
mode	0..1	<a href="#">RotatingMachineControlModeKind</a>	(NC) Mode of the rotating machine controller.
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2306

2307 Table 130 shows all association ends of RotatingMachineController with other classes.

2308 **Table 130 – Association ends of ExtControl::RotatingMachineController with other**  
2309 **classes**

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2310

2311 **3.6.3.33 (NC) InjectionController**2312 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :  
2313 IdentifiedObject : ExtEulIdentifiedObject2314 Injection controller is controlling the equipment which represents an injection or an external  
2315 network.

2316 Table 131 shows all attributes of InjectionController.

2317 **Table 131 – Attributes of ExtControl::InjectionController**

name	mult	type	description
mode	0..1	<a href="#">InjectionControlModeKind</a>	(NC) Mode of the injection controller.
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2318

2319 Table 132 shows all association ends of InjectionController with other classes.

2320 **Table 132 – Association ends of ExtControl::InjectionController with other classes**

mult from	name	mult to	type	description
0..1	EquivalentInjection	0..*	EquivalentInjection	(NC) Equivalent injection controlled by the injection controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2321

2322 **3.6.3.34 (NC) RotatingMachineControlModeKind enumeration**

2323 Kind of rotating machine controller mode.

2324 Table 133 shows all literals of RotatingMachineControlModeKind.

2325

**Table 133 – Literals of ExtControl::RotatingMachineControlModeKind**

literal	value	description
reactivePower		Reactive power control.
voltage		Voltage control.
powerFactor		Power factor is specified.
activePower		Active power is specified.

2326

2327 **3.6.3.35 (NC) InjectionControlModeKind enumeration**

2328 Kind of injection controller mode.

2329 Table 134 shows all literals of InjectionControlModeKind.

2330

**Table 134 – Literals of ExtControl::InjectionControlModeKind**

literal	value	description
reactivePower		Reactive power control.
activePower		Active power is specified.
voltage		Voltage control.
powerFactor		Power factor is specified.

2331

2332 **3.6.3.36 (NC) DirectCurrentBipoleController**2333 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :2334 [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2335 DC system bipole control that is the control system of a bipole in accordance with IEC 60633.

2336 Table 135 shows all attributes of DirectCurrentBipoleController.

2337

**Table 135 – Attributes of ExtControl::DirectCurrentBipoleController**

name	mult	type	description
mode	0..1	<a href="#">DCControlModeKind</a>	(NC) inherited from: <a href="#">DirectCurrentEquipmentController</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2338

2339

Table 136 shows all association ends of DirectCurrentBipoleController with other classes.

2340

**Table 136 – Association ends of ExtControl::DirectCurrentBipoleController with other classes**

2341

mult from	name	mult to	type	description
0..*	DirectCurrentMasterController	0..1	<a href="#">DirectCurrentMasterController</a>	(NC) Direct current master controller which has direct current bipole controllers.
0..1	DirectCurrentPoleController	2..2	<a href="#">DirectCurrentPoleController</a>	(NC) DC pole controller that is controlled by a DC bipole controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2342

2343

### 3.6.3.37 (NC) DirectCurrentPoleController

2344

Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2345

DC system pole control, which is the control system of a pole in accordance with IEC 60633.

2346

2347

Table 137 shows all attributes of DirectCurrentPoleController.

2348

**Table 137 – Attributes of ExtControl::DirectCurrentPoleController**

name	mult	type	description
mode	0..1	<a href="#">DCControlModeKind</a>	(NC) inherited from: <a href="#">DirectCurrentEquipmentController</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>

name	mult	type	description
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2349

2350

Table 138 shows all association ends of DirectCurrentPoleController with other classes.

2351

**Table 138 – Association ends of ExtControl::DirectCurrentPoleController with other classes**

2352

mult from	name	mult to	type	description
2..2	DirectCurrentBipoleController	0..1	<a href="#">DirectCurrentBipoleController</a>	(NC) DC bipole controller that controls this DC pole controller.
0..*	DirectCurrentMasterController	0..1	<a href="#">DirectCurrentMasterController</a>	(NC) DC master controller that has a DC pole controller.
0..1	DCPole	1..1	<a href="#">DCPole</a>	(NC) DC pole that is controlled by a DC pole controller.
0..1	ACDCConverterController	2..2	<a href="#">ACDCConverterController</a>	(NC) ACDC converter controller that is controlled by a DC pole controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2353

2354 **3.6.3.38 (NC) ACDCConverterController**

2355 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :  
2356 [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject  
2357 ACDC converter unit control. According to IEC 60633, it is the control system used for the  
2358 controlling, monitoring and protection of a single converter unit.  
2359 Table 139 shows all attributes of ACDCConverterController.

2360 **Table 139 – Attributes of ExtControl::ACDCConverterController**

name	mult	type	description
mode	0..1	<a href="#">DCControlModeKind</a>	(NC) inherited from: <a href="#">DirectCurrentEquipmentController</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2361 Table 140 shows all association ends of ACDCConverterController with other classes.  
2362

2363 **Table 140 – Association ends of ExtControl::ACDCConverterController with other**  
2364 **classes**

mult from	name	mult to	type	description
0..1	ACDCConverter	1..1	ACDCConverter	(NC) ACDC converter controlled by the direct current controller.
2..2	DirectCurrentPoleController	0..1	<a href="#">DirectCurrentPoleController</a>	(NC) DC pole controller that controls this ACDC controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

mult from	name	mult to	type	description
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2365

2366 **3.6.3.39 (NC) DirectCurrentEquipmentController**2367 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :  
2368 IdentifiedObject : ExtEulIdentifiedObject2369 Direct current equipment controller used to control different parts of the hierarchical structure  
2370 of the DC control system defined by IEC 60633.

2371 Table 141 shows all attributes of DirectCurrentEquipmentController.

2372 **Table 141 – Attributes of ExtControl::DirectCurrentEquipmentController**

name	mult	type	description
mode	0..1	<a href="#">DCControlModeKind</a>	(NC) Mode of the dc controller.
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2373

2374 Table 142 shows all association ends of DirectCurrentEquipmentController with other classes.

2375 **Table 142 – Association ends of ExtControl::DirectCurrentEquipmentController with  
2376 other classes**

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource

mult from	name	mult to	type	description
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2377

### 2378 3.6.3.40 (NC) DirectCurrentSubstationController

2379 Inheritance path = [DirectCurrentEquipmentController](#) : [EquipmentController](#) :  
 2380 [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject  
 2381 Control system used for the controlling, monitoring and protection within a DC substation (IEC  
 2382 60633). A DC substation control may be implemented at the bipole and/or pole level and may  
 2383 be referred to as local control.

2384 Table 143 shows all attributes of DirectCurrentSubstationController.

2385

**Table 143 – Attributes of ExtControl::DirectCurrentSubstationController**

name	mult	type	description
mode	0..1	<a href="#">DCControlModeKind</a>	(NC) inherited from: <a href="#">DirectCurrentEquipmentController</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2386

2387 Table 144 shows all association ends of DirectCurrentSubstationController with other classes.

**Table 144 – Association ends of ExtControl::DirectCurrentSubstationController with other classes**

mult from	name	mult to	type	description
2..*	MultiterminalControl	0..1	<a href="#">DirectCurrentMasterController</a>	(NC) Multiterminal control that controls more than two DC substation controllers.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>

2386

2387

2388

2389

mult from	name	mult to	type	description
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2390

2391 **3.6.3.41 (NC) DirectCurrentSubstationPoleController**

2392 Inheritance path = [DirectCurrentSubstationController](#) : [DirectCurrentEquipmentController](#) :  
 2393 [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject :  
 2394 ExtEulIdentifiedObject

2395 Control system of a substation pole (IEC 60633).

2396 Table 145 shows all attributes of DirectCurrentSubstationPoleController.

2397 **Table 145 – Attributes of ExtControl::DirectCurrentSubstationPoleController**

name	mult	type	description
mode	0..1	<a href="#">DCControlModeKind</a>	(NC) inherited from: <a href="#">DirectCurrentEquipmentController</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2398

2399 Table 146 shows all association ends of DirectCurrentSubstationPoleController with other  
 2400 classes.

2401 **Table 146 – Association ends of ExtControl::DirectCurrentSubstationPoleController**  
 2402 **with other classes**

mult from	name	mult to	type	description
0..1	DCSubstationPole	1..1	<a href="#">DCSubstationPole</a>	(NC) DC substation pole that is controlled by a DC substation pole controller.

mult from	name	mult to	type	description
2..*	MultiterminalControl	0..1	<a href="#">DirectCurrentMasterController</a>	(NC) inherited from: <a href="#">DirectCurrentSubstationController</a>
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2403

2404 **3.6.3.42 (NC) DirectCurrentSubstationBipoleController**

2405 Inheritance path = [DirectCurrentSubstationController](#) : [DirectCurrentEquipmentController](#) :  
 2406 [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject :  
 2407 ExtEulIdentifiedObject

2408 Control system of a substation bipole (IEC 60633).

2409 Table 147 shows all attributes of DirectCurrentSubstationBipoleController.

2410 **Table 147 – Attributes of ExtControl::DirectCurrentSubstationBipoleController**

name	mult	type	description
mode	0..1	<a href="#">DCControlModeKind</a>	(NC) inherited from: <a href="#">DirectCurrentEquipmentController</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2411

2412 Table 148 shows all association ends of DirectCurrentSubstationBipoleController with other  
2413 classes.

2414 **Table 148 – Association ends of ExtControl::DirectCurrentSubstationBipoleController**  
2415 **with other classes**

mult from	name	mult to	type	description
0..1	DCSubstationBipole	1..1	<a href="#">DCSubstationBipole</a>	(NC) DC substation bipole that is controlled by a DC substation bipole controller.
2..*	MultiterminalControl	0..1	<a href="#">DirectCurrentMasterController</a>	(NC) inherited from: <a href="#">DirectCurrentSubstationController</a>
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2416

### 2417 3.6.3.43 (NC) SystemControl

2418 Inheritance path = [AutomationFunction](#) : PowerSystemResource : IdentifiedObject :  
2419 ExtEulIdentifiedObject

2420 System control is the management and regulation of various parameters within the electrical  
2421 grid to ensure its stable and reliable operation. The primary goal of system control is to maintain  
2422 the balance between electricity generation and consumption, while also managing factors such  
2423 as voltage, frequency, and power quality. This involves the use of control devices, automation,  
2424 and monitoring systems to respond to changes in the grid and maintain its overall stability.

2425 This serves as Integrated AC and DC control system (IEC 60633) which governs the integrated  
2426 operation of AC and DC systems of a power system.

2427 Table 149 shows all attributes of SystemControl.

2428

**Table 149 – Attributes of ExtControl::SystemControl**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>

name	mult	type	description
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2429

2430

Table 150 shows all association ends of SystemControl with other classes.

2431

**Table 150 – Association ends of ExtControl::SystemControl with other classes**

mult from	name	mult to	type	description
0..1	EquipmentController	1..*	<a href="#">EquipmentController</a>	(NC) Equipment controller controls by this system control
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2432

2433

### 3.6.3.44 (NC) PowerFrequencyController

2434

Inheritance path = [SystemControl](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2435

2436

Power frequency controller is controlling the active power balance as typically done by the secondary control. If an unbalance between the scheduled active power values of each generation unit and the loads plus losses occurs, primary control will adapt (increase/decrease) the active power production of each unit (depending on the power shift key strategy), leading to an over- or under-frequency situation. The secondary frequency controller will then control the frequency back to its nominal value, re- establishing a cost-efficient generation delivered by each unit.

2437

2438

2439

2440

2441

2442

2443

Table 151 shows all attributes of PowerFrequencyController.

2444

**Table 151 – Attributes of ExtControl::PowerFrequencyController**

name	mult	type	description
mode	0..1	<a href="#">PowerFrequencyControlKind</a>	(NC) Mode of the power frequency controller.
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2445

2446

Table 152 shows all association ends of PowerFrequencyController with other classes.

2447

2448

**Table 152 – Association ends of ExtControl::PowerFrequencyController with other classes**

mult from	name	mult to	type	description
0..1	ControlArea	0..1	ControlArea	(NC) Control area which has a power frequency controller.
0..1	MonitoringArea	0..1	<a href="#">MonitoringArea</a>	(NC) Monitoring area that has this power frequency controller.
0..*	PowerShiftKeyStrategy	0..1	<a href="#">PowerShiftKeyStrategy</a>	(NC) Power shift key strategy for this power frequency controller.
0..1	FrequencyMonitoringTerminal	0..*	<a href="#">FrequencyMonitoringTerminal</a>	(NC) Frequency monitoring terminal for this power frequency controller.
0..1	EquipmentController	1..*	<a href="#">EquipmentController</a>	(NC) inherited from: <a href="#">SystemControl</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2449

2450 **3.6.3.45 (NC) PowerElectronicsUnitController**2451 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2452 Power electronics unit controller is controlling the equipment to optimize the power electronics unit.

2453 Table 153 shows all attributes of PowerElectronicsUnitController.

2456 **Table 153 – Attributes of ExtControl::PowerElectronicsUnitController**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2457

2458 Table 154 shows all association ends of PowerElectronicsUnitController with other classes.

2459 **Table 154 – Association ends of ExtControl::PowerElectronicsUnitController with other classes**

2460

mult from	name	mult to	type	description
0..1	PowerElectronicsUnit	0..*	PowerElectronicsUnit	(NC) Power electronics unit that has this power electronics unit controller.
0..*	PowerElectronicsConnectionController	0..1	<a href="#">PowerElectronicsConnectionController</a>	(NC) Power electronics connection controller for the power electronics unit controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2461

2462 **3.6.3.46 (NC) PowerElectronicsConnectionController**

2463 Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource :  
2464 IdentifiedObject : ExtEulIdentifiedObject

2465 Power electronics connection controller is controlling the equipment to optimize the power  
2466 electronics connection.

2467 Table 155 shows all attributes of PowerElectronicsConnectionController.

2468 **Table 155 – Attributes of ExtControl::PowerElectronicsConnectionController**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2469

2470 Table 156 shows all association ends of PowerElectronicsConnectionController with other  
2471 classes.

2472 **Table 156 – Association ends of ExtControl::PowerElectronicsConnectionController**  
2473 **with other classes**

mult from	name	mult to	type	description
0..1	PowerElectronicsUnitController	0..*	<a href="#">PowerElectronicsUnitController</a>	(NC) Power electronics unit controller that has this power electronics connection controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2474

### 2475 3.6.3.47 (NC) PowerFrequencyControlKind enumeration

2476 Kinds of power frequency control modes.

2477 Table 157 shows all literals of PowerFrequencyControlKind.

2478

**Table 157 – Literals of ExtControl::PowerFrequencyControlKind**

literal	value	description
frequency		Frequency control mode.
activePower		Active power control mode.
activePowerAndFrequency		Active power and frequency control mode.

2479

### 2480 3.6.3.48 (NC) AreaInterchangeController

2481 Inheritance path = [SystemControl](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2482 Area interchange control is set to control active power of an area.

2483 Table 158 shows all attributes of AreaInterchangeController.

2485

**Table 158 – Attributes of ExtControl::AreaInterchangeController**

name	mult	type	description
pTolerance	0..1	ActivePower	(NC) Active power net interchange tolerance. The attribute shall be a positive value or zero.
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2486

2487 Table 159 shows all association ends of AreaInterchangeController with other classes.

2488  
2489**Table 159 – Association ends of ExtControl::AreaInterchangeController with other classes**

mult from	name	mult to	type	description
0..1	ControlArea	0..1	ControlArea	(NC) Control area that has a area interchange controller.
0..1	BiddingZone	0..1	<a href="#">BiddingZone</a>	(NC) Bidding zone which has an area interchange controller.
0..1	BiddingZoneBorder	0..1	<a href="#">BiddingZoneBorder</a>	(NC) Bidding zone border that has an area interchange controller.
0..1	EquipmentController	1..*	<a href="#">EquipmentController</a>	(NC) inherited from: <a href="#">SystemControl</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2490

**2491 3.6.3.49 (NC) FrequencyMonitoringTerminal root class**

2492 Frequency monitoring terminal provides location in the model where the frequency is monitored  
2493 for the purpose of power frequency control.

2494 Table 160 shows all attributes of FrequencyMonitoringTerminal.

2495

**Table 160 – Attributes of ExtControl::FrequencyMonitoringTerminal**

name	mult	type	description
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
priority	0..1	Integer	(NC) Value 0 means ignore priority. 1 means the highest priority, 2 is the second highest priority.

2496

2497 Table 161 shows all association ends of FrequencyMonitoringTerminal with other classes.

2498 **Table 161 – Association ends of ExtControl::FrequencyMonitoringTerminal with other**  
2499 **classes**

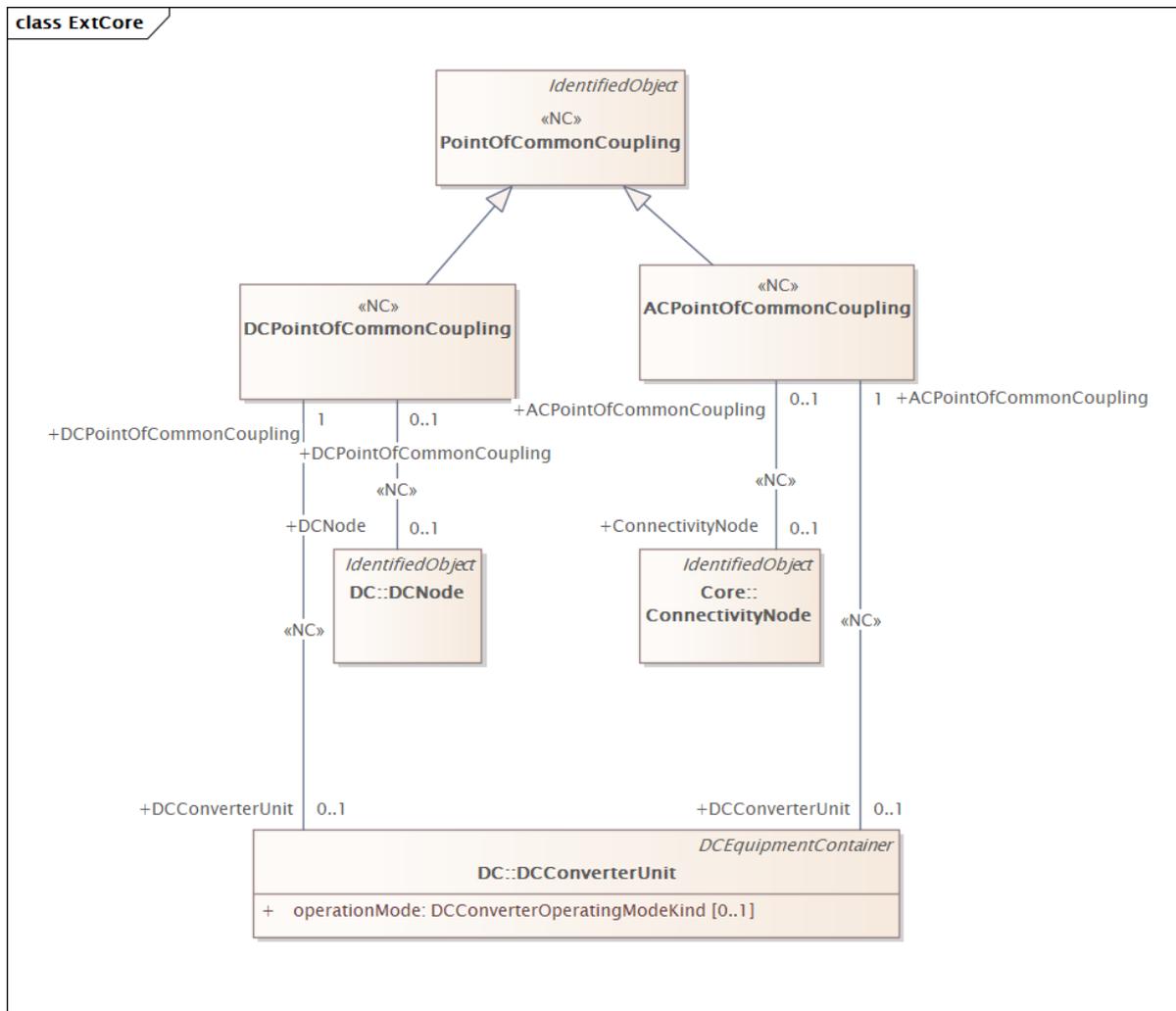
mult from	name	mult to	type	description
0..*	Terminal	0..1	Terminal	(NC) The terminal for this frequency monitoring terminal.
0..*	PowerFrequencyController	0..1	<a href="#">PowerFrequencyController</a>	(NC) Power frequency controller that has this frequency monitoring terminal.

2500

2501 **3.6.4 Package ExtCore**

2502 **3.6.4.1 General**

2503 This package contains the extensions related to the core.



2504

2505 **Figure 12 – Class diagram ExtCore::ExtCore**

2506 Figure 12: The diagram contains classes related to core.

2507 **3.6.4.2 (NC) PointOfCommonCoupling**

2508 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

2509 Point of Common Coupling (PCC) refers to the location where multiple electrical sources or  
2510 loads are electrically connected and provide a reference point where the voltages and currents  
2511 from different parts of the system are considered to be common. The PCC is used to support  
2512 system analysis, control, and monitoring, as it provides a reference for understanding the  
2513 interactions and power flow between various components within the system. It is also relevant  
2514 to define the requirement and responsibility between different actors in operating a power  
2515 system.

2516 Table 162 shows all attributes of PointOfCommonCoupling.

2517 **Table 162 – Attributes of ExtCore::PointOfCommonCoupling**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2518

2519 Table 163 shows all association ends of PointOfCommonCoupling with other classes.

2520 **Table 163 – Association ends of ExtCore::PointOfCommonCoupling with other classes**

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2521

### 2522 3.6.4.3 (NC) ACPointOfCommonCoupling

2523 Inheritance path = [PointOfCommonCoupling](#) : IdentifiedObject : ExtEulIdentifiedObject

2524 Point of interconnection of the DC converter station to the adjacent AC system (IEC 60633).

2525 Table 164 shows all attributes of ACPointOfCommonCoupling.

2526 **Table 164 – Attributes of ExtCore::ACPointOfCommonCoupling**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2527

2528 Table 165 shows all association ends of ACPointOfCommonCoupling with other classes.

2529 **Table 165 – Association ends of ExtCore::ACPointOfCommonCoupling with other**  
2530 **classes**

mult from	name	mult to	type	description
0..1	ConnectivityNode	0..1	ConnectivityNode	(NC) Connectivity node which is a point of common coupling AC.
1..1	DCConverterUnit	0..1	DCConverterUnit	(NC) DC converter unit that has AC point of common coupling.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2531

#### 2532 3.6.4.4 (NC) DCPointOfCommonCoupling

2533 Inheritance path = [PointOfCommonCoupling](#) : IdentifiedObject : ExtEulIdentifiedObject  
2534 Point of interconnection of the DC converter station to the DC transmission line (IEC 60633).  
2535 Table 166 shows all attributes of DCPointOfCommonCoupling.

2536 **Table 166 – Attributes of ExtCore::DCPointOfCommonCoupling**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2537

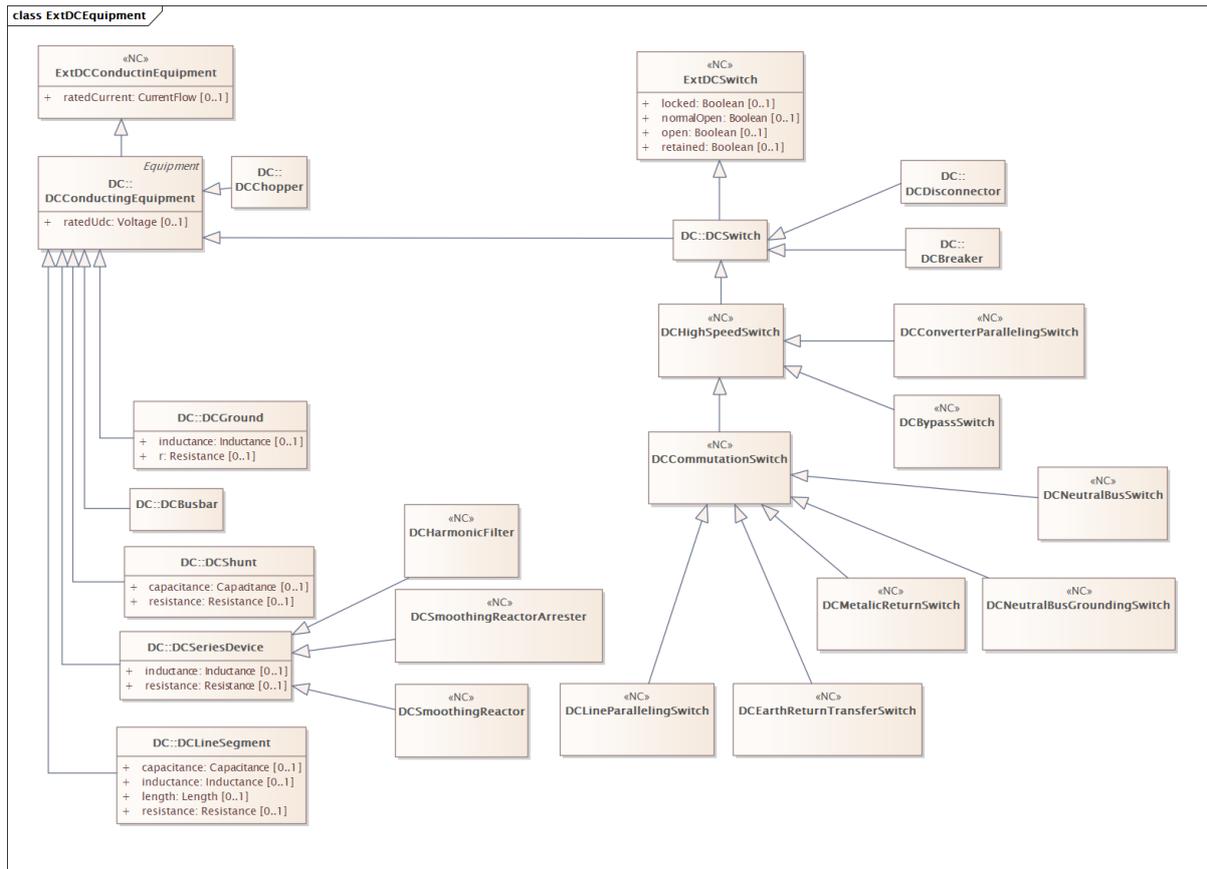
2538 Table 167 shows all association ends of DCPointOfCommonCoupling with other classes.

2539 **Table 167 – Association ends of ExtCore::DCPointOfCommonCoupling with other**  
2540 **classes**

mult from	name	mult to	type	description
1..1	DCConverterUnit	0..1	DCConverterUnit	(NC) DC converter unit that has DC point of common coupling.
0..1	DCNode	0..1	DCNode	(NC) The DCNode that is a point of common coupling DC.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2541





2548

2549

**Figure 14 – Class diagram ExtDirectCurent::ExtDCEquipment**

2550

Figure 14: The diagram shows the DC equipment model.



2560

2561 Table 169 shows all association ends of ACTieCorridor with other classes.

2562 **Table 169 – Association ends of ExtDirectCurent::ACTieCorridor with other classes**

mult from	name	mult to	type	description
0..1	Line	0..*	Line	(NC) Line that is part of the ACTieCorridor.
0..1	TieFlow	0..*	TieFlow	(NC) inherited from: <a href="#">TieCorridor</a>
0..*	BiddingZoneBorder	0..1	<a href="#">BiddingZoneBorder</a>	(NC) inherited from: <a href="#">TieCorridor</a>
0..*	LoadFrequencyControlArea	0..1	<a href="#">LoadFrequencyControlArea</a>	(NC) inherited from: <a href="#">TieCorridor</a>
0..1	AreaDispatchableUnit	0..*	<a href="#">AreaDispatchableUnit</a>	(NC) inherited from: <a href="#">TieCorridor</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2563

2564 **3.6.5.3 (NC) DCPole**

2565 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2566 The direct current (DC) system pole (IEC 60633) is part of a DC system consisting of all the  
2567 equipment in the DC substations and the interconnecting transmission lines, if any, which during  
2568 normal operation exhibit a common direct voltage polarity with respect to earth.

2569 Table 170 shows all attributes of DCPole.

2570 **Table 170 – Attributes of ExtDirectCurent::DCPole**

name	mult	type	description
normalParticipationFactor	0..1	Float	(NC) Normal participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ . In the case of priority strategy, the item with the lowest number gets allocated energy first.
p	0..1	ActivePower	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the

name	mult	type	description
			member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ . In the case of priority strategy, the item with the lowest number gets allocated energy first.
maxEconomicP	0..1	ActivePower	(NC) Maximum high economic active power limit, that should not exceed the maximum operating active power limit.
minEconomicP	0..1	ActivePower	(NC) Low economic active power limit that shall be greater than or equal to the minimum operating active power limit.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2571  
2572  
2573

Table 171 shows all association ends of DCPole with other classes.

**Table 171 – Association ends of ExtDirectCurent::DCPole with other classes**

mult from	name	mult to	type	description
0..1	DCConverterUnit	2..2	DCConverterUnit	(NC) The DC converter unit that relates to this DC pole.
0..1	DCLine	0..1	DCLine	(NC) The DC line that is related to this DC pole.
1..1	DirectCurrentPoleController	0..1	<a href="#">DirectCurrentPoleController</a>	(NC) DC pole controller that controls this DC pole.
0..*	DCTieCorridor	0..1	<a href="#">DCTieCorridor</a>	(NC) The DCTieCorridor that has this DC pole.
0..1	PowerSchedule	0..*	<a href="#">PowerSchedule</a>	(NC) Power schedule which has DC poles.
0..1	PowerShiftKeySchedule	0..*	<a href="#">PowerShiftKeySchedule</a>	(NC) The Power Shift Key schedule for a DCPole.
1..2	DCBiPole	0..1	<a href="#">DCBiPole</a>	(NC) DC system bipole that has two independently operatable DC system poles.
0..1	AsymmetricMonopolarDCSystem	0..1	<a href="#">MonopolarDCSystem</a>	(NC) Asymmetric monopolar DC system that has this DC pole.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2574

2575 **3.6.5.4 (NC) DCTieCorridor**

2576 Inheritance path = [TieCorridor](#) : PowerSystemResource : IdentifiedObject :  
2577 ExtEulIdentifiedObject

2578 A collection of one or more direct current poles that connect two different control areas.

2579 Table 172 shows all attributes of DCTieCorridor.

2580

**Table 172 – Attributes of ExtDirectCurent::DCTieCorridor**

name	mult	type	description
maxRegulatingReserve	0..1	ActivePower	(NC) Maximum regulating reserve.
minRegulatingReserve	0..1	ActivePower	(NC) Minimum regulating reserve.
rampingKind	0..1	<a href="#">RampingPrincipleKind</a>	(NC) Ramping principle is used to define a transition from one scheduled value to next one.
p	0..1	ActivePower	(NC) Active power at the point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution in the case a simplified power flow model is used.
q	0..1	ReactivePower	(NC) Reactive power at the point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution in the case a simplified power flow model is used.
delayRegulatingReserve	0..1	Seconds	(NC) inherited from: <a href="#">TieCorridor</a>
maxRegulatingReserveRamp	0..1	Float	(NC) inherited from: <a href="#">TieCorridor</a>
thresholdRegulatingReserve	0..1	ActivePower	(NC) inherited from: <a href="#">TieCorridor</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2581

2582 Table 173 shows all association ends of DCTieCorridor with other classes.

2583

**Table 173 – Association ends of ExtDirectCurent::DCTieCorridor with other classes**

mult from	name	mult to	type	description
0..1	AssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) The assessed element indicating that the DC tie corridor is assessed, i.e. monitored.
0..1	MustRunSchedule	0..*	<a href="#">MustRunSchedule</a>	(NC) Must run schedule which has DC tie corridors.

mult from	name	mult to	type	description
0..1	PowerSchedule	0..*	<a href="#">PowerSchedule</a>	(NC) Power schedule which has DC tie corridors.
0..1	SchedulingArea	0..1	<a href="#">SchedulingArea</a>	(NC) The scheduling area that has this DC tie corridor.
0..1	DirectCurrentMasterController	0..1	<a href="#">DirectCurrentMasterController</a>	(NC) Direct current master controller for this DCTieCorridor.
0..1	DCPole	0..*	<a href="#">DCPole</a>	(NC) The DCPole which is part of the DC corridor.
0..1	TieFlow	0..*	TieFlow	(NC) inherited from: <a href="#">TieCorridor</a>
0..*	BiddingZoneBorder	0..1	<a href="#">BiddingZoneBorder</a>	(NC) inherited from: <a href="#">TieCorridor</a>
0..*	LoadFrequencyControlArea	0..1	<a href="#">LoadFrequencyControlArea</a>	(NC) inherited from: <a href="#">TieCorridor</a>
0..1	AreaDispatchableUnit	0..*	<a href="#">AreaDispatchableUnit</a>	(NC) inherited from: <a href="#">TieCorridor</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2584

2585 **3.6.5.5 (NC) TieCorridor**

2586 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2587 A collection of one or more tie-lines or direct current poles that connect two different control

2588 areas.

2589 Table 174 shows all attributes of TieCorridor.

2590

**Table 174 – Attributes of ExtDirectCurent::TieCorridor**

name	mult	type	description
delayRegulatingReserve	0..1	Seconds	(NC) A positive number that is a multiple of Automatic Generation Control (AGC) run cycles that describes the delay in adapting imbalance of the tie corridor.
maxRegulatingReserveRamp	0..1	Float	(NC) Maximum authorized ramp for regulating reserve.
thresholdRegulatingReserve	0..1	ActivePower	(NC) Regulating reserve threshold.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2591

2592 Table 175 shows all association ends of TieCorridor with other classes.

2593

**Table 175 – Association ends of ExtDirectCurent::TieCorridor with other classes**

mult from	name	mult to	type	description
0..1	TieFlow	0..*	TieFlow	(NC) Tie flow which belongs to the tie corridor.
0..*	BiddingZoneBorder	0..1	<a href="#">BiddingZoneBorder</a>	(NC) Bidding zone border in which the tie corridor is located.
0..*	LoadFrequencyControlArea	0..1	<a href="#">LoadFrequencyControlArea</a>	(NC) LoadFrequencyControlArea controlling the TieCorridor.
0..1	AreaDispatchableUnit	0..*	<a href="#">AreaDispatchableUnit</a>	(NC) AreaDispatchableUnit for the Tie Corridor.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2594

**3.6.5.6 (NC) DCBypassSwitch**

2596 Inheritance path = [DCHighSpeedSwitch](#) : DCSwitch : DCConductingEquipment : Equipment :  
 2597 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtDCConductinEquipment](#) :  
 2598 [ExtDCSwitch](#)

2599 By-pass switch (IEC 60633) is a high-speed DC switch connected across each converter valve  
 2600 group in DC schemes using more than one independent converter per pole, designed to close  
 2601 rapidly to bypass a converter group that is being taken out of service and commutate the current  
 2602 back into a valve group that is being taken back in service. A by-pass switch may also be used  
 2603 for prolonged shunting of the bridge(s).

2604 Table 176 shows all attributes of DCBypassSwitch.

2605

**Table 176 – Attributes of ExtDirectCurent::DCBypassSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
ratedCurrent	0..1	CurrentFlow	inherited from: <a href="#">ExtDCConductinEquipment</a>
normalOpen	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
retained	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
open	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
locked	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>

2606

2607

Table 177 shows all association ends of DCBypassSwitch with other classes.

2608

**Table 177 – Association ends of ExtDirectCurent::DCBypassSwitch with other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2609

2610

### 3.6.5.7 (NC) ExtDCSwitch root class

2611

European network codes extension to base CIM counterpart.

2612

Table 178 shows all attributes of ExtDCSwitch.

2613

**Table 178 – Attributes of ExtDirectCurent::ExtDCSwitch**

name	mult	type	description
normalOpen	0..1	Boolean	The attribute is used in cases when no Measurement for the status value is present. If the DCSwitch has a status measurement the Discrete.normalValue is expected to match with the DCSwitch.normalOpen.

name	mult	type	description
retained	0..1	Boolean	Branch is retained in the topological solution. The flow through retained switches will normally be calculated in power flow.
open	0..1	Boolean	The attribute tells if the switch is considered open when used as input to topology processing.
locked	0..1	Boolean	If true, the switch is locked. The resulting switch state is a combination of locked and DCSwitch.open attributes as follows: - locked=true and DCSwitch.open=true. The resulting state is open and locked; - locked=false and DCSwitch.open=true. The resulting state is open; - locked=false and DCSwitch.open=false. The resulting state is closed.

2614

### 2615 3.6.5.8 (NC) ExtDCConductinEquipment root class

2616 European network codes extension to base CIM counterpart.

2617 Table 179 shows all attributes of ExtDCConductinEquipment.

#### 2618 Table 179 – Attributes of ExtDirectCurent::ExtDCConductinEquipment

name	mult	type	description
ratedCurrent	0..1	CurrentFlow	The maximum continuous current carrying capacity in amps governed by the device material and construction. The attribute shall be a positive value.

2619

### 2620 3.6.5.9 (NC) RampingPrincipleKind enumeration

2621 Kind of ramping principle.

2622 Table 180 shows all literals of RampingPrincipleKind.

#### 2623 Table 180 – Literals of ExtDirectCurent::RampingPrincipleKind

literal	value	description
fiveMinutes		Five minutes ramping principle. Ramping starts five minutes before the schedule time point and ends five minutes after. For instance, if the schedule time point is 19:30h it starts at 19:25h and ends at 19:35h.
fifteenMinutes		Fifteen minutes ramping principle. Ramping starts 15 minutes before the schedule time point and ends 15 minutes after. For instance, if the schedule time point is 19:30h it starts at 19:15h and ends at 19:45h.
continuous		Continuous ramping principle is applied between two scheduled time point. For instance, from 10 MW to 70 MW over one hour the change is 1 MW/min.
tenMinutes		Ten minutes ramping principle. Ramping starts 10 minutes before the schedule time point and ends 10 minutes after. For instance, if the schedule time point is 19:30h it starts at 19:20h and ends at 19:40h.
maxContinuous		Maximum continuous ramping principle. The schedule is kept as long as possible and the maximum ramping rate is used to get from one point to another, symmetrically around the

literal	value	description
		schedule time points. For example, there is 40 MW change in the schedule the maximum ramp rate is 20 MW/min the ramping starts 1 min before (e.g. 19:29h) and finishes 1 min after (e.g. 19:31h).

2624

2625 **3.6.5.10 (NC) DCSystem**

2626 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2627 Electrical power system which transfers energy in the form of direct current between two or more AC buses (defined in IEC 60633).

2628 Table 181 shows all attributes of DCSystem.

2630

**Table 181 – Attributes of ExtDirectCurent::DCSystem**

name	mult	type	description
directionKind	0..1	<a href="#">DCSystemDirectionKind</a>	(NC) Direction kind of the DC system.
transmissionKind	0..1	<a href="#">DCSystemTransmissionKind</a>	(NC) Transmission kind of the DC system.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2631

2632 Table 182 shows all association ends of DCSystem with other classes.

2633

**Table 182 – Association ends of ExtDirectCurent::DCSystem with other classes**

mult from	name	mult to	type	description
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2634

2635 **3.6.5.11 (NC) BipolarDCSystem**2636 Inheritance path = [DCSystem](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2637 Bipolar DC system (IEC 60633) consists of two poles of opposite polarity with respect to earth.

2638 The overhead lines, if any, of the two poles may be carried on common or separate towers.

2639 Table 183 shows all attributes of BipolarDCSystem.

2640

2641

**Table 183 – Attributes of ExtDirectCurent::BipolarDCSystem**

name	mult	type	description
isRigid	0..1	Boolean	(NC) If true, the bipolar DC system is a rigid DC current bipolar system (IEC 60633). It is a bipolar DC system without neutral connection between both converter stations. Since only two (pole) conductors exist, no unbalance current between both poles is possible. In case of interruption of power transfer of one converter pole, the current of the other pole has to be interrupted as well (at least for a limited time to allow reconfiguration of the DC circuit).
directionKind	0..1	<a href="#">DCSystemDirectionKind</a>	(NC) inherited from: <a href="#">DCSystem</a>
transmissionKind	0..1	<a href="#">DCSystemTransmissionKind</a>	(NC) inherited from: <a href="#">DCSystem</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2642

2643

Table 184 shows all association ends of BipolarDCSystem with other classes.

2644

**Table 184 – Association ends of ExtDirectCurent::BipolarDCSystem with other classes**

mult from	name	mult to	type	description
0..1	DCBiPole	0..1	<a href="#">DCBiPole</a>	(NC) DC bipole that belongs to a bipolar DC system.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2645

**3.6.5.12 (NC) MonopolarDCSystem**

2647 Inheritance path = [DCSystem](#) : PowerSystemResource : IdentifiedObject :  
2648 ExtEulIdentifiedObject

2649 Monopolar DC system (IEC 60633) is a DC system with only one pole.

2650 Table 185 shows all attributes of MonopolarDCSystem.

2651

**Table 185 – Attributes of ExtDirectCurent::MonopolarDCSystem**

name	mult	type	description
isSymmetrical	0..1	Boolean	(NC) if true, the monopolar DC system is symmetrical monopolar DC system (IEC 60633). It is a DC system with only one symmetrical monopole. A symmetrical monopole is part of an DC system consisting of all the equipment in the DC substations and the interconnecting transmission lines, if any, which during normal operation exhibits equal and opposite direct voltage polarities with respect to earth but without series connection of converters in each converter station. The term "symmetrical monopole" is used even though there are two polarities with DC voltages, because with only one converter it is not possible to provide the redundancy which is normally associated with the term "bipole".
directionKind	0..1	<a href="#">DCSystemDirectionKind</a>	(NC) inherited from: <a href="#">DCSystem</a>
transmissionKind	0..1	<a href="#">DCSystemTransmissionKind</a>	(NC) inherited from: <a href="#">DCSystem</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2652

2653

Table 186 shows all association ends of MonopolarDCSystem with other classes.

2654

2655

**Table 186 – Association ends of ExtDirectCurent::MonopolarDCSystem with other classes**

mult from	name	mult to	type	description
0..1	DCPole	0..1	<a href="#">DCPole</a>	(NC) DC pole part of the asymmetric DC system.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2656

2657

**3.6.5.13 (NC) DCSystemDirectionKind enumeration**

2658

Direction kinds of the DC system.

2659

Table 187 shows all literals of DCSystemDirectionKind.

2660

**Table 187 – Literals of ExtDirectCurent::DCSystemDirectionKind**

literal	value	description
unidirectional		Unidirectional DC system used for the transfer of energy in only one direction. According to IEC 60633, most DC systems are inherently bidirectional. However, some systems may be optimized to transmit power in only one preferred direction. Such systems may still be considered as "bidirectional".
bidirectional		Bidirectional DC system used for the transfer of energy in either direction. According to IEC 60633 a multiterminal DC system is bidirectional if one or more substations are bidirectional.

2661

**3.6.5.14 (NC) DCBiPole**

2663 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2664 DC system bipole (IEC 60633), which is part of an DC system consisting of two independently operable DC system poles, which during normal operation, exhibit opposite direct voltage polarities with respect to earth.

2667 Table 188 shows all attributes of DCBiPole.

2668

**Table 188 – Attributes of ExtDirectCurent::DCBiPole**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2669

2670 Table 189 shows all association ends of DCBiPole with other classes.

2671

**Table 189 – Association ends of ExtDirectCurent::DCBiPole with other classes**

mult from	name	mult to	type	description
0..1	DCPole	1..2	<a href="#">DCPole</a>	(NC) DC pole part of the DC system bipole.
0..1	BipolarDCSystem	0..1	<a href="#">BipolarDCSystem</a>	(NC) Bipolar DC system that has this DC bipole.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2672

2673 **3.6.5.15 (NC) DCSystemTransmissionKind enumeration**

2674 DC system transmission kind.

2675 Table 190 shows all literals of DCSystemTransmissionKind.

2676

**Table 190 – Literals of ExtDirectCurent::DCSystemTransmissionKind**

literal	value	description
twoTerminal		Two-terminal DC transmission system (IEC 60633), consisting of two DC substations and the connecting DC transmission line(s).
multiTerminal		Multiterminal DC transmission system (IEC 60633) consisting of more than two separated DC substations and the interconnecting DC transmission lines.
backToBack		DC back-to-back system (IEC 60633) is a DC system which transfers energy between AC buses at the same location.

2677

2678 **3.6.5.16 (NC) DCSubstation**

2679 Inheritance path = DCEquipmentContainer : EquipmentContainer : ConnectivityNodeContainer :

2680 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2681 DC substation or DC converter station (IEC 60633) is part of an DC system which consists of  
 2682 one or more converter units installed in a single location together with buildings, reactors, filters,  
 2683 reactive power supply, control, monitoring, protective, measuring and auxiliary equipment. A  
 2684 DC substation forming part of an DC transmission system may be referred to as an DC  
 2685 transmission substation.

2686 Table 191 shows all attributes of DCSubstation.

2687

**Table 191 – Attributes of ExtDirectCurent::DCSubstation**

name	mult	type	description
isTapping	0..1	Boolean	(NC) DC tapping substation (IEC 60633) is a DC substation, mainly used for inversion, with a rating which is a small fraction of that of the rectifier(s) in the system.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2688

2689 Table 192 shows all association ends of DCSubstation with other classes.

2690

**Table 192 – Association ends of ExtDirectCurent::DCSubstation with other classes**

mult from	name	mult to	type	description
0..*	Substation	0..1	Substation	(NC) Substation that contains this DC substation.
0..1	DCConverterUnit	0..*	DCConverterUnit	(NC) DC converter unit that belongs to this DC substation.
0..1	DCSubstationBipole	0..*	<a href="#">DCSubstationBipole</a>	(NC) DC substation bipole which is part of the DC substation.

mult from	name	mult to	type	description
0..1	DCSubstationPole	0..*	<a href="#">DCSubstationPole</a>	(NC) DC substation pole which is part of the DC substation.
0..1	DCTopologicalNode	0..*	DCTopologicalNode	inherited from: DCEquipmentContainer
1..1	DCNodes	0..*	DCNode	inherited from: DCEquipmentContainer
0..*	HVDCInterconnectionDynamics	0..1	HVDCInterconnectionDynamics	inherited from: DCEquipmentContainer
0..1	Equipments	0..*	Equipment	inherited from: EquipmentContainer
0..*	AdditionalGroupedEquipment	0..*	Equipment	inherited from: EquipmentContainer
1..1	ConnectivityNodes	0..*	ConnectivityNode	inherited from: ConnectivityNodeContainer
0..1	TopologicalNode	0..*	TopologicalNode	inherited from: ConnectivityNodeContainer
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2691

2692 **3.6.5.17 (NC) DCSubstationBipole**

2693 Inheritance path = DCEquipmentContainer : EquipmentContainer : ConnectivityNodeContainer :

2694 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2695 Part of a bipolar DC system (IEC 60633) contained within a DC substation.

2696 Table 193 shows all attributes of DCSubstationBipole.

2697

**Table 193 – Attributes of ExtDirectCurrent::DCSubstationBipole**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2698

2699 Table 194 shows all association ends of DCSubstationBipole with other classes.

2700  
2701**Table 194 – Association ends of ExtDirectCurent::DCSubstationBipole with other classes**

mult from	name	mult to	type	description
0..*	DCSubstation	0..1	<a href="#">DCSubstation</a>	(NC) DC substation that contains this DC substation bipole part.
1..1	DirectCurrentSubstation BipoleController	0..1	<a href="#">DirectCurrentSubstation BipoleController</a>	(NC) DC substation bipole controller controlling this DC substation bipole.
0..1	DCTopologicalNode	0..*	DCTopologicalNode	inherited from: DCEquipmentContainer
1..1	DCNodes	0..*	DCNode	inherited from: DCEquipmentContainer
0..*	HVDCInterconnectionDynamics	0..1	HVDCInterconnectionDynamics	inherited from: DCEquipmentContainer
0..1	Equipments	0..*	Equipment	inherited from: EquipmentContainer
0..*	AdditionalGroupedEquipment	0..*	Equipment	inherited from: EquipmentContainer
1..1	ConnectivityNodes	0..*	ConnectivityNode	inherited from: ConnectivityNodeContainer
0..1	TopologicalNode	0..*	TopologicalNode	inherited from: ConnectivityNodeContainer
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2702

**3.6.5.18 (NC) DCSubstationPole**

2704 Inheritance path = DCEquipmentContainer : EquipmentContainer : ConnectivityNodeContainer :  
2705 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

2706 Part of an DC system pole (IEC 60633) which is contained within a DC substation.

2707 Table 195 shows all attributes of DCSubstationPole.

2708

**Table 195 – Attributes of ExtDirectCurent::DCSubstationPole**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2709

2710

Table 196 shows all association ends of DCSubstationPole with other classes.

2711 **Table 196 – Association ends of ExtDirectCurent::DCSubstationPole with other classes**

mult from	name	mult to	type	description
0..*	DCSubstation	0..1	<a href="#">DCSubstation</a>	(NC) DC substation that contains this DC substation pole part.
1..1	DirectCurrentSubstation PoleController	0..1	<a href="#">DirectCurrentSubstation PoleController</a>	(NC) DC substation pole controller controlling this DC substation pole.
0..1	DCTopologicalNode	0..*	DCTopologicalNode	inherited from: DCEquipmentContainer
1..1	DCNodes	0..*	DCNode	inherited from: DCEquipmentContainer
0..*	HVDCInterconnectionDynamics	0..1	HVDCInterconnectionDynamics	inherited from: DCEquipmentContainer
0..1	Equipments	0..*	Equipment	inherited from: EquipmentContainer
0..*	AdditionalGroupedEquipment	0..*	Equipment	inherited from: EquipmentContainer
1..1	ConnectivityNodes	0..*	ConnectivityNode	inherited from: ConnectivityNodeContainer
0..1	TopologicalNode	0..*	TopologicalNode	inherited from: ConnectivityNodeContainer
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2712

2713 **3.6.5.19 (NC) DC Smoothing Reactor**

2714 Inheritance path = DCSeriesDevice : DCConductingEquipment : Equipment :  
 2715 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtDCConductingEquipment](#)  
 2716 Reactor (IEC 60633) connected in series with a converter unit or converter units on the DC side  
 2717 for the primary purpose of smoothing the direct current and reducing current transients.

2718 Table 197 shows all attributes of DC Smoothing Reactor.

2719

**Table 197 – Attributes of ExtDirectCurent::DC Smoothing Reactor**

name	mult	type	description
inductance	0..1	Inductance	inherited from: DCSeriesDevice
resistance	0..1	Resistance	inherited from: DCSeriesDevice
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
ratedCurrent	0..1	CurrentFlow	inherited from: <a href="#">ExtDCCConductinEquipment</a>

2720  
2721

Table 198 shows all association ends of DCSSmoothingReactor with other classes.

2722  
2723

**Table 198 – Association ends of ExtDirectCurent::DCSSmoothingReactor with other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2724

### 2725 3.6.5.20 (NC) DCSSmoothingReactorArrester

2726 Inheritance path = DCSeriesDevice : DCConductingEquipment : Equipment :  
2727 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtDCCConductinEquipment](#)  
2728 Arrester (IEC 60633) connected between the terminals of a smoothing reactor.

2729 Table 199 shows all attributes of DCSSmoothingReactorArrester.

2730

**Table 199 – Attributes of ExtDirectCurent::DCSSmoothingReactorArrester**

name	mult	type	description
inductance	0..1	Inductance	inherited from: DCSeriesDevice
resistance	0..1	Resistance	inherited from: DCSeriesDevice

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
ratedCurrent	0..1	CurrentFlow	inherited from: <a href="#">ExtDCConductinEquipment</a>

2731  
2732

Table 200 shows all association ends of DCsmoothingReactorArrester with other classes.

2733  
2734

**Table 200 – Association ends of ExtDirectCurent::DCsmoothingReactorArrester with other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2735

### 2736 3.6.5.21 (NC) DCHarmonicFilter

2737 Inheritance path = DCSeriesDevice : DCConductingEquipment : Equipment :  
2738 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtDCConductinEquipment](#)

2739 DC harmonic filter (IEC 60633) is a filter which, in conjunction with the DC reactor(s) and with  
 2740 the DC surge capacitor(s), if any, serves the primary function of reducing (current or voltage)  
 2741 ripple on the DC transmission line and/or earth electrode line.  
 2742 Table 201 shows all attributes of DCHarmonicFilter.

2743 **Table 201 – Attributes of ExtDirectCurent::DCHarmonicFilter**

name	mult	type	description
inductance	0..1	Inductance	inherited from: DCSeriesDevice
resistance	0..1	Resistance	inherited from: DCSeriesDevice
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
ratedCurrent	0..1	CurrentFlow	inherited from: <a href="#">ExtDCConductinEquipment</a>

2744

2745 Table 202 shows all association ends of DCHarmonicFilter with other classes.

2746 **Table 202 – Association ends of ExtDirectCurent::DCHarmonicFilter with other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2747

2748 **3.6.5.22 (NC) DCHighSpeedSwitch**

2749 Inheritance path = DCSwitch : DCConductingEquipment : Equipment : PowerSystemResource :

2750 IdentifiedObject : ExtEulIdentifiedObject : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)

2751 High-speed DC switch (IEC 60633) is a type of switchgear used on a DC scheme, required to  
 2752 open or close rapidly (< 1 s), including in some cases the need to commutate load current into  
 2753 a parallel conducting path, but with no requirement to interrupt fault or load current. DC  
 2754 switchgear is usually based on a single-phase unit of an AC circuit-breaker, appropriately  
 2755 modified for their DC applications. Their capabilities to perform faster opening and closing than  
 2756 disconnect switches are used but the function of breaking short-circuit currents is not required.  
 2757 Table 203 shows all attributes of DCHighSpeedSwitch.

2758

**Table 203 – Attributes of ExtDirectCurent::DCHighSpeedSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
ratedCurrent	0..1	CurrentFlow	inherited from: <a href="#">ExtDCConductinEquipment</a>
normalOpen	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
retained	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
open	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
locked	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>

2759

2760 Table 204 shows all association ends of DCHighSpeedSwitch with other classes.

2761 **Table 204 – Association ends of ExtDirectCurent::DCHighSpeedSwitch with other**  
 2762 **classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment

mult from	name	mult to	type	description
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2763

2764 **3.6.5.23 (NC) DCCommutationSwitch**

2765 Inheritance path = [DCHighSpeedSwitch](#) : DCSwitch : DCConductingEquipment : Equipment :  
 2766 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtDCConductinEquipment](#) :  
 2767 [ExtDCSwitch](#)

2768 DC commutation switch (IEC 60633) is a type of high-speed DC switch specifically designed to  
 2769 commutate load current into an alternative parallel current path.

2770 Table 205 shows all attributes of DCCommutationSwitch.

2771

**Table 205 – Attributes of ExtDirectCurent::DCCommutationSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
ratedCurrent	0..1	CurrentFlow	inherited from: <a href="#">ExtDCConductinEquipment</a>
normalOpen	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
retained	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
open	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
locked	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>

2772

2773 Table 206 shows all association ends of DCCommutationSwitch with other classes.

2774 **Table 206 – Association ends of ExtDirectCurent::DCCommutationSwitch with other**  
2775 **classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2776

### 2777 3.6.5.24 (NC) DCMetallicReturnSwitch

2778 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : DCSwitch :  
2779 DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :  
2780 ExtEulIdentifiedObject : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)

2781 Metallic return transfer switch (IEC 60633) is a DC commutation switch used to transfer DC  
2782 current from an earth return path to a metallic return path. Although the term "metallic return  
2783 transfer breaker" has been widely used in the industry for many years, it is misleading since  
2784 such switches have no ability to interrupt fault current.

2785 Table 207 shows all attributes of DCMetallicReturnSwitch.

2786 **Table 207 – Attributes of ExtDirectCurent::DCMetallicReturnSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
ratedCurrent	0..1	CurrentFlow	inherited from: <a href="#">ExtDCConductinEquipment</a>
normalOpen	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
retained	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
open	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
locked	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>

2787

2788

Table 208 shows all association ends of DCMetalicReturnSwitch with other classes.

2789

**Table 208 – Association ends of ExtDirectCurent::DCMetalicReturnSwitch with other classes**

2790

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2791

2792

### 3.6.5.25 (NC) DCEarthReturnTransferSwitch

2793

Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : DCSwitch :  
2794 DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :  
2795 ExtEulIdentifiedObject : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)

2796

2796 Earth return transfer switch (IEC 60633) DC commutation switch used to transfer DC current  
2797 from a metallic return path to an earth return path. In some applications, this function is  
2798 performed by a by-pass switch. Although the term "earth return transfer breaker" has been

2799 widely used in the industry for many years, it is misleading since such switches have no ability  
2800 to interrupt fault current.  
2801 Table 209 shows all attributes of DCEarthReturnTransferSwitch.

2802 **Table 209 – Attributes of ExtDirectCurent::DCEarthReturnTransferSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
ratedCurrent	0..1	CurrentFlow	inherited from: <a href="#">ExtDCConductinEquipment</a>
normalOpen	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
retained	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
open	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
locked	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>

2803  
2804 Table 210 shows all association ends of DCEarthReturnTransferSwitch with other classes.

2805 **Table 210 – Association ends of ExtDirectCurent::DCEarthReturnTransferSwitch with**  
2806 **other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

mult from	name	mult to	type	description
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2807

2808 **3.6.5.26 (NC) DCNeutralBusSwitch**

2809 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : DCSwitch :  
 2810 DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :  
 2811 ExtEulIdentifiedObject : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)

2812 Neutral bus switch (IEC 60633) is a DC commutation switch connected in series with the neutral  
 2813 bus on a bipolar DC scheme, designed to commutate current out of the pole conductor or neutral  
 2814 bus and into the electrode line or dedicated metallic return conductor or earth in response to a  
 2815 fault in a converter or neutral bus.

2816 Table 211 shows all attributes of DCNeutralBusSwitch.

2817

**Table 211 – Attributes of ExtDirectCurent::DCNeutralBusSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
ratedCurrent	0..1	CurrentFlow	inherited from: <a href="#">ExtDCConductinEquipment</a>
normalOpen	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
retained	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
open	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
locked	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>

2818

2819 Table 212 shows all association ends of DCNeutralBusSwitch with other classes.

**Table 212 – Association ends of ExtDirectCurent::DCNeutralBusSwitch with other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment

2820

2821

mult from	name	mult to	type	description
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2822

2823 **3.6.5.27 (NC) DCNeutralBusGroundingSwitch**

2824 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : DCSwitch :  
 2825 DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :  
 2826 ExtEulIdentifiedObject : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)

2827 Neutral bus grounding switch (IEC 60633) or a neutral bus earthing switch is a DC commutation  
 2828 switch connected from the neutral bus to the station earth mat on a bipolar DC scheme,  
 2829 designed to provide a temporary earth connection in the event of an open circuit fault on the  
 2830 electrode line until the imbalance of current between the two poles can be reduced to a safe  
 2831 minimum level or the electrode line connection can be restored.

2832 Table 213 shows all attributes of DCNeutralBusGroundingSwitch.

2833

**Table 213 – Attributes of ExtDirectCurent::DCNeutralBusGroundingSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
ratedCurrent	0..1	CurrentFlow	inherited from: <a href="#">ExtDCConductinEquipment</a>
normalOpen	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>

name	mult	type	description
retained	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
open	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
locked	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>

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Table 214 shows all association ends of DCNeutralBusGroundingSwitch with other classes.

**Table 214 – Association ends of ExtDirectCurent::DCNeutralBusGroundingSwitch with other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2838

### 2839 3.6.5.28 (NC) DCConverterParallelingSwitch

2840 Inheritance path = [DCHighSpeedSwitch](#) : DCSwitch : DCConductingEquipment : Equipment :  
2841 PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtDCConductinEquipment](#) :  
2842 [ExtDCSwitch](#)

2843 Converter paralleling switch (IEC 60633) is a high-speed DC switch connected in series with  
2844 each converter at the DC terminal in DC schemes where two or more converters are connected  
2845 in parallel onto a common pole conductor, designed to allow additional converter(s) to be  
2846 connected in parallel or disconnected without affecting the load current in the other converter.  
2847 Table 215 shows all attributes of DCConverterParallelingSwitch.

2848 **Table 215 – Attributes of ExtDirectCurent::DCConverterParallelingSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment

name	mult	type	description
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
ratedCurrent	0..1	CurrentFlow	inherited from: <a href="#">ExtDCConductinEquipment</a>
normalOpen	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
retained	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
open	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
locked	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>

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2850  
2851  
2852

Table 216 shows all association ends of DCConverterParallelingSwitch with other classes.

**Table 216 – Association ends of ExtDirectCurent::DCConverterParallelingSwitch with other classes**

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2853

2854 **3.6.5.29 (NC) DCLineParallelingSwitch**

2855 Inheritance path = [DCCommutationSwitch](#) : [DCHighSpeedSwitch](#) : DCSwitch :  
 2856 DCConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :  
 2857 ExtEulIdentifiedObject : [ExtDCConductinEquipment](#) : [ExtDCSwitch](#)

2858 Line paralleling switch (IEC 60633) DC commutation switch placed in series with one or more  
 2859 high-voltage pole conductors, allowing two or more lines to be connected in parallel or to revert  
 2860 to single-line operation while conducting load current.

2861 Table 217 shows all attributes of DCLineParallelingSwitch.

2862 **Table 217 – Attributes of ExtDirectCurent::DCLineParallelingSwitch**

name	mult	type	description
ratedUdc	0..1	Voltage	inherited from: DCConductingEquipment
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
ratedCurrent	0..1	CurrentFlow	inherited from: <a href="#">ExtDCConductinEquipment</a>
normalOpen	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
retained	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
open	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>
locked	0..1	Boolean	inherited from: <a href="#">ExtDCSwitch</a>

2863

2864 Table 218 shows all association ends of DCLineParallelingSwitch with other classes.

2865 **Table 218 – Association ends of ExtDirectCurent::DCLineParallelingSwitch with other classes**

2866

mult from	name	mult to	type	description
1..1	DCTerminals	0..*	DCTerminal	inherited from: DCConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentCon tainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource

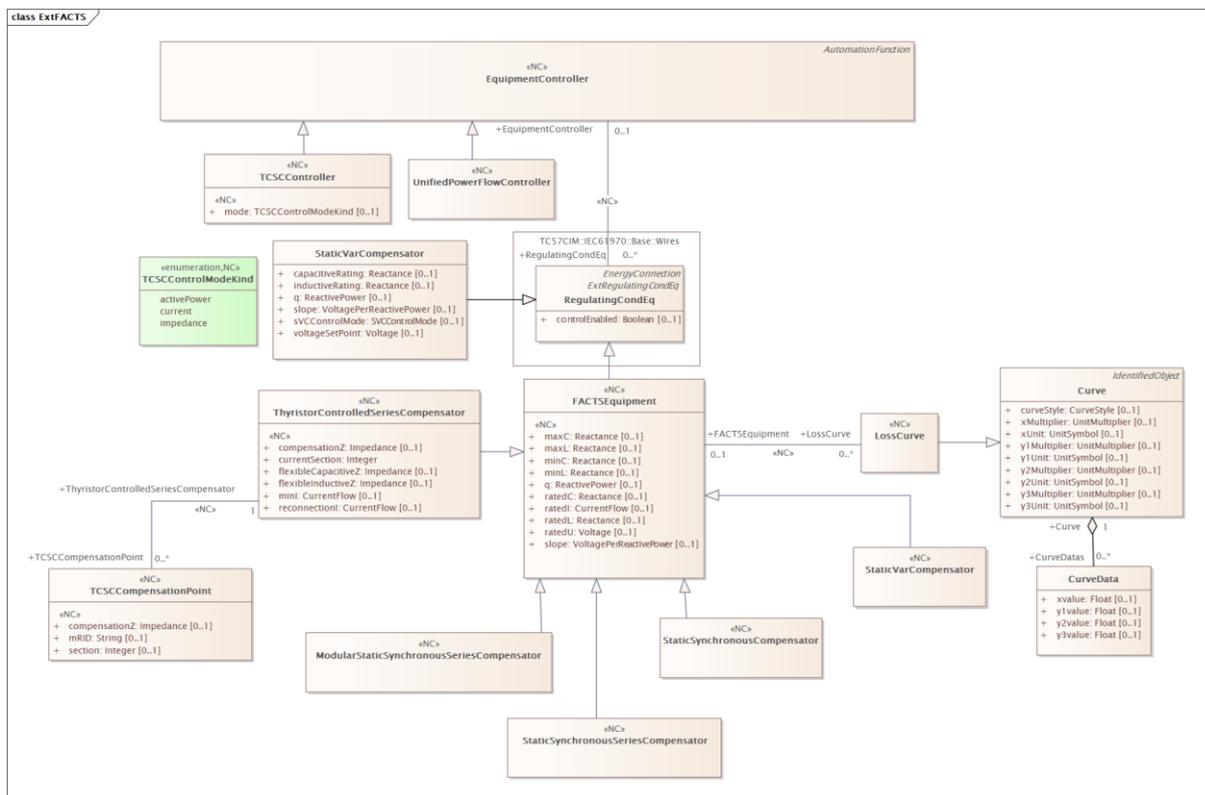
mult from	name	mult to	type	description
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2867

2868 **3.6.6 Package ExtFACTS**

2869 **3.6.6.1 General**

2870 This package contains the extensions related to the FACTS.



2871

2872 **Figure 16 – Class diagram ExtFACTS::ExtFACTS**

2873 Figure 16: The diagram contains association related to FACTS.

2874 **3.6.6.2 (NC) FACTSEquipment**

2875 Inheritance path = RegulatingCondEq : EnergyConnection : ConductingEquipment :  
 2876 Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject  
 2877 Flexible Alternating Current Transmission System regulating equipment.  
 2878 Table 219 shows all attributes of FACTSEquipment.

2879

**Table 219 – Attributes of ExtFACTS::FACTSEquipment**

name	mult	type	description
slope	0..1	VoltagePerReactivePower	(NC) The characteristics slope which defines how the reactive power output changes in proportion to the difference between the regulated bus voltage and the voltage setpoint. The attribute shall be a positive value or zero.
q	0..1	ReactivePower	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.
ratedI	0..1	CurrentFlow	(NC) Rated current of the FACTS equipment.
ratedU	0..1	Voltage	(NC) Rated voltage of the FACTS equipment.
ratedC	0..1	Reactance	(NC) Capacitive reactance at maximum reactive power. Shall always be positive.
ratedL	0..1	Reactance	(NC) Inductive rating at maximum inductive reactive power. Shall always be negative.
minC	0..1	Reactance	(NC) Capacitive reactance at minimum reactive power. Shall always be positive.
maxC	0..1	Reactance	(NC) Capacitive reactance at maximum reactive power. Shall always be positive.
minL	0..1	Reactance	(NC) Inductive rating at minimum inductive reactive power. Shall always be negative.
maxL	0..1	Reactance	(NC) Inductive rating at maximum inductive reactive power. Shall always be negative.
controlEnabled	0..1	Boolean	inherited from: RegulatingCondEq
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2880

2881

Table 220 shows all association ends of FACTSEquipment with other classes.

2882

**Table 220 – Association ends of ExtFACTS::FACTSEquipment with other classes**

mult from	name	mult to	type	description
0..1	LossCurve	0..*	<a href="#">LossCurve</a>	(NC) The loss curve for the FACTS equipment.
0..*	RegulatingControl	0..1	RegulatingControl	inherited from: RegulatingCondEq
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment

mult from	name	mult to	type	description
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2883

2884 **3.6.6.3 (NC) LossCurve**

2885 Inheritance path = Curve : IdentifiedObject : ExtEulIdentifiedObject

2886 Represents the losses in the equipment due to operation position.

2887 Table 221 shows all attributes of LossCurve.

2888

**Table 221 – Attributes of ExtFACTS::LossCurve**

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2889

2890

Table 222 shows all association ends of LossCurve with other classes.

2891

**Table 222 – Association ends of ExtFACTS::LossCurve with other classes**

mult from	name	mult to	type	description
0..*	FACTSEquipment	0..1	<a href="#">FACTSEquipment</a>	(NC) The FACTS equipment which has a loss curve.
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2892

2893

**3.6.6.4 (NC) ModularStaticSynchronousSeriesCompensator**

2894

Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :

2895

ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :

2896

ExtEulIdentifiedObject

2897

Modular static synchronous series compensator (MSSSC) is a type of flexible AC transmission

2898

system regulating equipment which consists of solid-state voltage source inverter connected in

2899

series with a transmission line. This is similar to static synchronous series compensator

2900

(SSSC), but without injection transformer. This enables the MSSSC to be truly modular with the

2901

ability to simply install a number of equipment in series to provide a desired maximum level of

2902

impedance. MSSSC can be dispersed into multiple location in a circuit working collectively

2903

under the same controller scheme.

2904

Table 223 shows all attributes of ModularStaticSynchronousSeriesCompensator.

2905

**Table 223 – Attributes of ExtFACTS::ModularStaticSynchronousSeriesCompensator**

name	mult	type	description
slope	0..1	VoltagePerReactivePower	(NC) inherited from: <a href="#">FACTSEquipment</a>
q	0..1	ReactivePower	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedI	0..1	CurrentFlow	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedU	0..1	Voltage	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
minC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
maxC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
minL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
maxL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
controlEnabled	0..1	Boolean	inherited from: RegulatingCondEq
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment

name	mult	type	description
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2906

2907

2908

Table 224 shows all association ends of ModularStaticSynchronousSeriesCompensator with other classes.

2909

2910

**Table 224 – Association ends of  
ExtFACTS::ModularStaticSynchronousSeriesCompensator with other classes**

mult from	name	mult to	type	description
0..1	LossCurve	0..*	<a href="#">LossCurve</a>	(NC) inherited from: <a href="#">FACTSEquipment</a>
0..*	RegulatingControl	0..1	RegulatingControl	inherited from: RegulatingCondEq
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2911

2912 **3.6.6.5 (NC) StaticSynchronousCompensator**

2913 Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :  
2914 ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :  
2915 ExtEulIdentifiedObject

2916 Static synchronous compensator (STATCOM), also known as a static synchronous condenser  
2917 (STATCON), is a type of flexible AC transmission system regulating equipment used on  
2918 alternating current electricity transmission networks. It is based on a power electronics voltage-  
2919 source converter and can act as either a source or sink of reactive AC power to an electricity  
2920 network. If connected to a source of power it can also provide active AC power.

2921 Table 225 shows all attributes of StaticSynchronousCompensator.

2922 **Table 225 – Attributes of ExtFACTS::StaticSynchronousCompensator**

name	mult	type	description
slope	0..1	VoltagePerReactivePower	(NC) inherited from: <a href="#">FACTSEquipment</a>
q	0..1	ReactivePower	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedI	0..1	CurrentFlow	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedU	0..1	Voltage	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
minC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
maxC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
minL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
maxL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
controlEnabled	0..1	Boolean	inherited from: RegulatingCondEq
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2923

2924 Table 226 shows all association ends of StaticSynchronousCompensator with other classes.

2925 **Table 226 – Association ends of ExtFACTS::StaticSynchronousCompensator with other classes**  
2926

mult from	name	mult to	type	description
0..1	LossCurve	0..*	<a href="#">LossCurve</a>	(NC) inherited from: <a href="#">FACTSEquipment</a>
0..*	RegulatingControl	0..1	RegulatingControl	inherited from: RegulatingCondEq
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment

mult from	name	mult to	type	description
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2927

### 2928 3.6.6.6 (NC) StaticVarCompensator

2929 Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :  
 2930 ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :  
 2931 ExtEulIdentifiedObject

2932 A facility for providing variable and controllable shunt reactive power. The SVC typically  
 2933 consists of a stepdown transformer, filter, thyristor-controlled reactor, and thyristor-switched  
 2934 capacitor arms.

2935 The SVC may operate in fixed MVar output mode or in voltage control mode. When in voltage  
 2936 control mode, the output of the SVC will be proportional to the deviation of voltage at the  
 2937 controlled bus from the voltage setpoint. The SVC characteristic slope defines the proportion.  
 2938 If the voltage at the controlled bus is equal to the voltage setpoint, the SVC MVar output is zero.  
 2939 Table 227 shows all attributes of StaticVarCompensator.

2940

**Table 227 – Attributes of ExtFACTS::StaticVarCompensator**

name	mult	type	description
slope	0..1	VoltagePerReactivePower	(NC) inherited from: <a href="#">FACTSEquipment</a>
q	0..1	ReactivePower	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedI	0..1	CurrentFlow	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedU	0..1	Voltage	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>

name	mult	type	description
ratedL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
minC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
maxC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
minL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
maxL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
controlEnabled	0..1	Boolean	inherited from: RegulatingCondEq
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

2941

2942

Table 228 shows all association ends of StaticVarCompensator with other classes.

2943

**Table 228 – Association ends of ExtFACTS::StaticVarCompensator with other classes**

mult from	name	mult to	type	description
0..1	LossCurve	0..*	<a href="#">LossCurve</a>	(NC) inherited from: <a href="#">FACTSEquipment</a>
0..*	RegulatingControl	0..1	RegulatingControl	inherited from: RegulatingCondEq
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2944

2945 **3.6.6.7 (NC) TCSCCompensationPoint root class**

2946 Compensation point of a TCSC compensator.

2947 Table 229 shows all attributes of TCSCCompensationPoint.

2948

**Table 229 – Attributes of ExtFACTS::TCSCCompensationPoint**

name	mult	type	description
compensationZ	0..1	Impedance	(NC) The compensation impedance for this compensation point.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
section	0..1	Integer	(NC) The number of the section.

2949

2950 Table 230 shows all association ends of TCSCCompensationPoint with other classes.

**Table 230 – Association ends of ExtFACTS::TCSCCompensationPoint with other classes**

2951

2952

mult from	name	mult to	type	description
0..*	ThyristorControlledSeriesCompensator	1..1	<a href="#">ThyristorControlledSeriesCompensator</a>	(NC) TCSC that has different compensation points.

2953

2954 **3.6.6.8 (NC) ThyristorControlledSeriesCompensator**

2955 Inheritance path = [FACTSEquipment](#) : RegulatingCondEq : EnergyConnection :  
 2956 ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject :  
 2957 ExtEulIdentifiedObject

2958 Thyristor-controlled series capacitors (TCSC) is a type of flexible AC transmission system  
 2959 regulating equipment that is configured with controlled reactors in parallel with sections of a  
 2960 capacitor bank. This combination allows smooth control of the fundamental frequency  
 2961 capacitive reactance over a wide range. The thyristor valve contains a string of series connected  
 2962 high power thyristors. TCSC can control power flows in order to achieve eliminating of line  
 2963 overloads, reducing loop flows and minimising system losses.

2964 Table 231 shows all attributes of ThyristorControlledSeriesCompensator.

2965

**Table 231 – Attributes of ExtFACTS::ThyristorControlledSeriesCompensator**

name	mult	type	description
compensationZ	0..1	Impedance	(NC) The actual compensation impedance provided by the compensator. The attribute value shall be positive if compensation is in the capacitive range. The attribute value shall be negative if compensation is in the inductive rating.
flexibleCapacitiveZ	0..1	Impedance	(NC) Flexible impedance that can be controlled by the compensator when operating in the capacitive range. Shall always be positive.
flexibleInductiveZ	0..1	Impedance	(NC) Flexible impedance that can be controlled by the compensator when operating in the inductive range. Shall always be negative.
minI	0..1	CurrentFlow	(NC) Minimum current below which the device bypassed.
reconnectionI	0..1	CurrentFlow	(NC) The current for which the TCSC returns back to operation after bypass.
currentSection	1..1	Integer	(NC) The current section on which the TCSC is operating.
slope	0..1	VoltagePerReactivePower	(NC) inherited from: <a href="#">FACTSEquipment</a>
q	0..1	ReactivePower	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedI	0..1	CurrentFlow	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedU	0..1	Voltage	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
ratedL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
minC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
maxC	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
minL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
maxL	0..1	Reactance	(NC) inherited from: <a href="#">FACTSEquipment</a>
controlEnabled	0..1	Boolean	inherited from: RegulatingCondEq
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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Table 232 shows all association ends of ThyristorControlledSeriesCompensator with other classes.

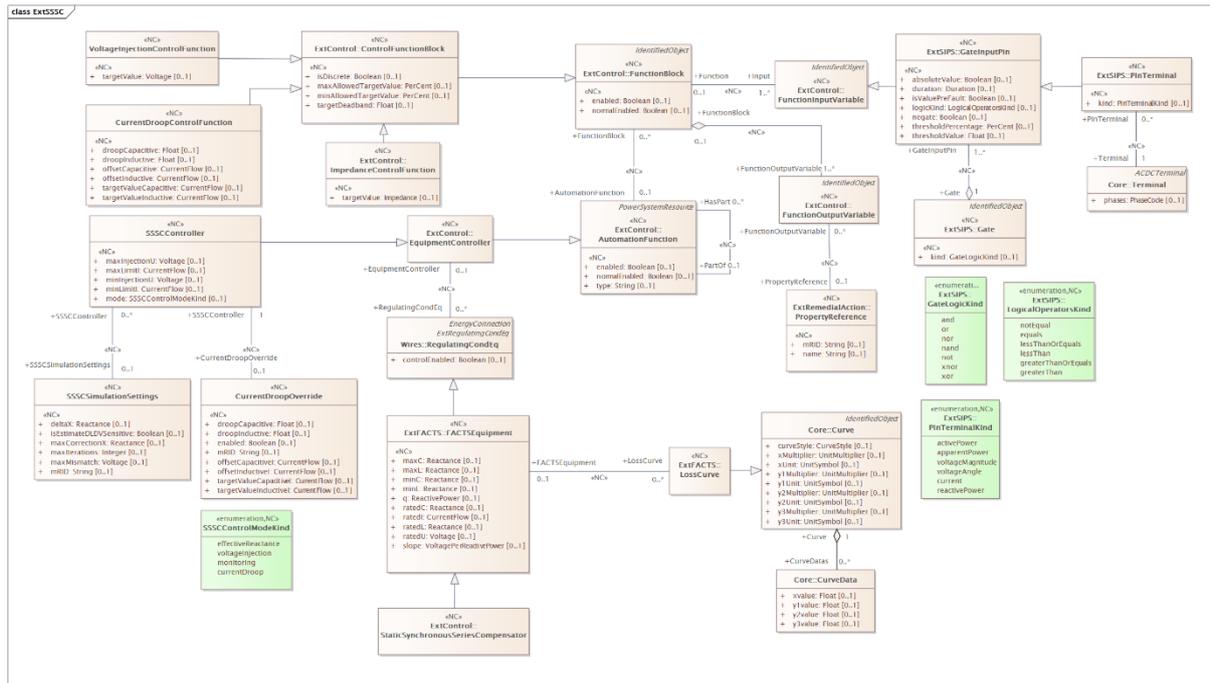
2969  
2970**Table 232 – Association ends of ExtFACTS::ThyristorControlledSeriesCompensator with other classes**

mult from	name	mult to	type	description
1..1	TCSCCompensationPoint	0..*	<a href="#">TCSCCompensationPoint</a>	(NC) Compensation point for this TCSC.
0..1	LossCurve	0..*	<a href="#">LossCurve</a>	(NC) inherited from: <a href="#">FACTSEquipment</a>
0..*	RegulatingControl	0..1	RegulatingControl	inherited from: RegulatingCondEq
0..*	BaseVoltage	0..1	BaseVoltage	inherited from: ConductingEquipment
1..1	SvStatus	0..*	SvStatus	inherited from: ConductingEquipment
0..*	ProtectionEquipments	0..*	ProtectionEquipment	inherited from: ConductingEquipment
1..1	Terminals	0..*	Terminal	inherited from: ConductingEquipment
0..1	RelayDynamics	0..*	RelayDynamics	inherited from: ConductingEquipment
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2971

2972 **3.6.6.9 Package ExtSSSC**2973 **3.6.6.9.1 General**

2974 This package contains the extensions related to the SSSC.



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2976

**Figure 17 – Class diagram ExtSSSC::ExtSSSC**

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Figure 17: The diagram shows necessary extensions to model controls of SSSC controller.

2978

**3.6.6.9.2 (NC) CurrentDropControlFunction**

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Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : [IdentifiedObject](#) : [ExtEulIdentifiedObject](#)

2980

Current droop control function is a function block that calculates the operating point of the controlled equipment to achieve the target current.

2981

Table 233 shows all attributes of CurrentDropControlFunction.

2982

2983

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**Table 233 – Attributes of ExtSSSC::CurrentDropControlFunction**

name	mult	type	description
targetValueInductive	0..1	CurrentFlow	(NC) Setpoint when control is active in inductive region.
offsetInductive	0..1	CurrentFlow	(NC) Offset in capacitive region.
droopInductive	0..1	Float	(NC) Droop in inductive region. The unit is V/A.
targetValueCapacitive	0..1	CurrentFlow	(NC) Setpoint when control is active in capacitive region.
offsetCapacitive	0..1	CurrentFlow	(NC) Offset in capacitive region.
droopCapacitive	0..1	Float	(NC) Droop in capacitive region. The unit is V/A.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: <a href="#">IdentifiedObject</a>
description	0..1	String	inherited from: <a href="#">IdentifiedObject</a>

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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2986  
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2988

Table 234 shows all association ends of CurrentDropControlFunction with other classes.

**Table 234 – Association ends of ExtSSSC::CurrentDropControlFunction with other classes**

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	<a href="#">ControlFunctionBlockAction</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

2989

### 2990 3.6.6.9.3 (NC) CurrentDropOverride root class

2991 Current droop override uses the following logic:

- 2992 - When the current exceeds a threshold the device executes the following transitions: 1) When  
2993 injecting an inductive voltage or in monitoring mode the device tends to inject a voltage  
2994 proportional to the difference between the line current and the aforementioned threshold. 2)  
2995 When injecting a capacitive voltage the device transitions to monitoring mode.  
2996 - If the aforementioned proportional voltage is lower than the initial one, the voltage injection  
2997 remains unchanged.

2998 Current droop override is not applied when the device operates in currentDrop mode.

2999 Table 235 shows all attributes of CurrentDropOverride.

3000

**Table 235 – Attributes of ExtSSSC::CurrentDropOverride**

name	mult	type	description
droopCapacitive	0..1	Float	(NC) Droop in capacitive region. The unit is V/A.
droopInductive	0..1	Float	(NC) Droop in inductive region. The unit is V/A.
enabled	0..1	Boolean	(NC) True, if the current droop override is enabled (active). Otherwise false.
offsetCapacitiveI	0..1	CurrentFlow	(NC) Offset in capacitive region.
offsetInductiveI	0..1	CurrentFlow	(NC) Offset in capacitive region.
targetValueCapacitiveI	0..1	CurrentFlow	(NC) Setpoint when control is active in capacitive region.

name	mult	type	description
targetValueInductivel	0..1	CurrentFlow	(NC) Setpoint when control is active in inductive region.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

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Table 236 shows all association ends of CurrentDroopOverride with other classes.

3003

**Table 236 – Association ends of ExtSSSC::CurrentDroopOverride with other classes**

mult from	name	mult to	type	description
0..1	SSSCController	1..1	<a href="#">SSSCController</a>	(NC) The SSSC controller to which this CurrentDroopOverride applies to.

3004

#### 3.6.6.9.4 (NC) SSSCController

Inheritance path = [EquipmentController](#) : [AutomationFunction](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

The controller of a Static synchronous series compensator (SSSC).

Table 237 shows all attributes of SSSCController.

3010

**Table 237 – Attributes of ExtSSSC::SSSCController**

name	mult	type	description
mode	0..1	<a href="#">SSSCControlModeKind</a>	(NC) Mode of the Static Synchronous Series compensator controller.
minInjectionU	0..1	Voltage	(NC) Minimum voltage that the device can inject.
maxInjectionU	0..1	Voltage	(NC) Maximum voltage that the device can inject.
maxLimitI	0..1	CurrentFlow	(NC) Maximum operating current limit applied for the controller and used by any of the available control functions.
minLimitI	0..1	CurrentFlow	(NC) Minimum operating current limit applied for the controller and used by any of the available control functions.
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3011

3012

Table 238 shows all association ends of SSSCController with other classes.

3013

**Table 238 – Association ends of ExtSSSC::SSSCController with other classes**

mult from	name	mult to	type	description
1..1	CurrentDroopOverride	0..1	<a href="#">CurrentDroopOverride</a>	(NC) The current droop override for this SSSC controller. It is not used when the SSSC controller is in mode currentDroop.
0..*	SSSCSimulationSettings	0..1	<a href="#">SSSCSimulationSettings</a>	(NC) The simulation settings that apply for this controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	EquipmentControllerAction	0..*	<a href="#">EquipmentControllerAction</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..*	SystemControl	0..1	<a href="#">SystemControl</a>	(NC) inherited from: <a href="#">EquipmentController</a>
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3014

**3015 3.6.6.9.5 (NC) SSSCSimulationSettings root class**

3016 SSSC control simulation settings used by the algorithm for power flow calculations.

3017 Table 239 shows all attributes of SSSCSimulationSettings.

3018

**Table 239 – Attributes of ExtSSSC::SSSCSimulationSettings**

name	mult	type	description
maxCorrectionX	0..1	Reactance	(NC) Maximum value of the reactance correction applied between iterations of the power flow calculation algorithm for the purpose of achieving control target value.
maxMismatch	0..1	Voltage	(NC) Maximum mismatch tolerance of voltage target value. If mismatch is lower, convergence is claimed. It is only used for voltageInjection and currentDroop control modes.
deltaX	0..1	Reactance	(NC) Reactance delta for the solution algorithm. The solution “outer-loop” algorithm is based on a secant method which needs two initial points. The second point is calculated from the first one by either adding or subtracting this “delta”. The “seed” is assumed to be 0 ohms.

name	mult	type	description
isEstimateDLDSensitivity	0..1	Boolean	(NC) Defines if the estimate is considering the dl/dV sensitivity (true) instead of the secant algorithm (false).
maxIterations	0..1	Integer	(NC) Maximum number of iterations before claiming an open line condition. The algorithm uses it to assess if a line is really open by making sure low-currents are observed on various consecutive iterations.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

3019

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Table 240 shows all association ends of SSSCSimulationSettings with other classes.

3021

**Table 240 – Association ends of ExtSSSC::SSSCSimulationSettings with other classes**

mult from	name	mult to	type	description
0..1	SSSCController	0..*	<a href="#">SSSCController</a>	(NC) The controller that uses these simulation settings.

3022

### 3.6.6.9.6 (NC) VoltageInjectionControlFunction

Inheritance path = [ControlFunctionBlock](#) : [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject

Voltage injection control function is a function block that calculates the operating point of the controlled equipment to achieve the target voltage injection. The controlled point is the Terminal with sequenceNumber =1.

Table 241 shows all attributes of VoltageInjectionControlFunction.

3030

**Table 241 – Attributes of ExtSSSC::VoltageInjectionControlFunction**

name	mult	type	description
targetValue	0..1	Voltage	(NC) Target value for the voltage that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
isDiscrete	0..1	Boolean	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
targetDeadband	0..1	Float	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 242 shows all association ends of VoltageInjectionControlFunction with other classes.

3033

**Table 242 – Association ends of ExtSSSC::VoltageInjectionControlFunction with other classes**

3034

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	<a href="#">ControlFunctionBlockAction</a>	(NC) inherited from: <a href="#">ControlFunctionBlock</a>
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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3036

### 3.6.6.9.7 (NC) SSSCControlModeKind enumeration

3037

Control modes of the Static Synchronous Series Compensator (SSSC).

3038

Table 243 shows all literals of SSSCControlModeKind.

3039

**Table 243 – Literals of ExtSSSC::SSSCControlModeKind**

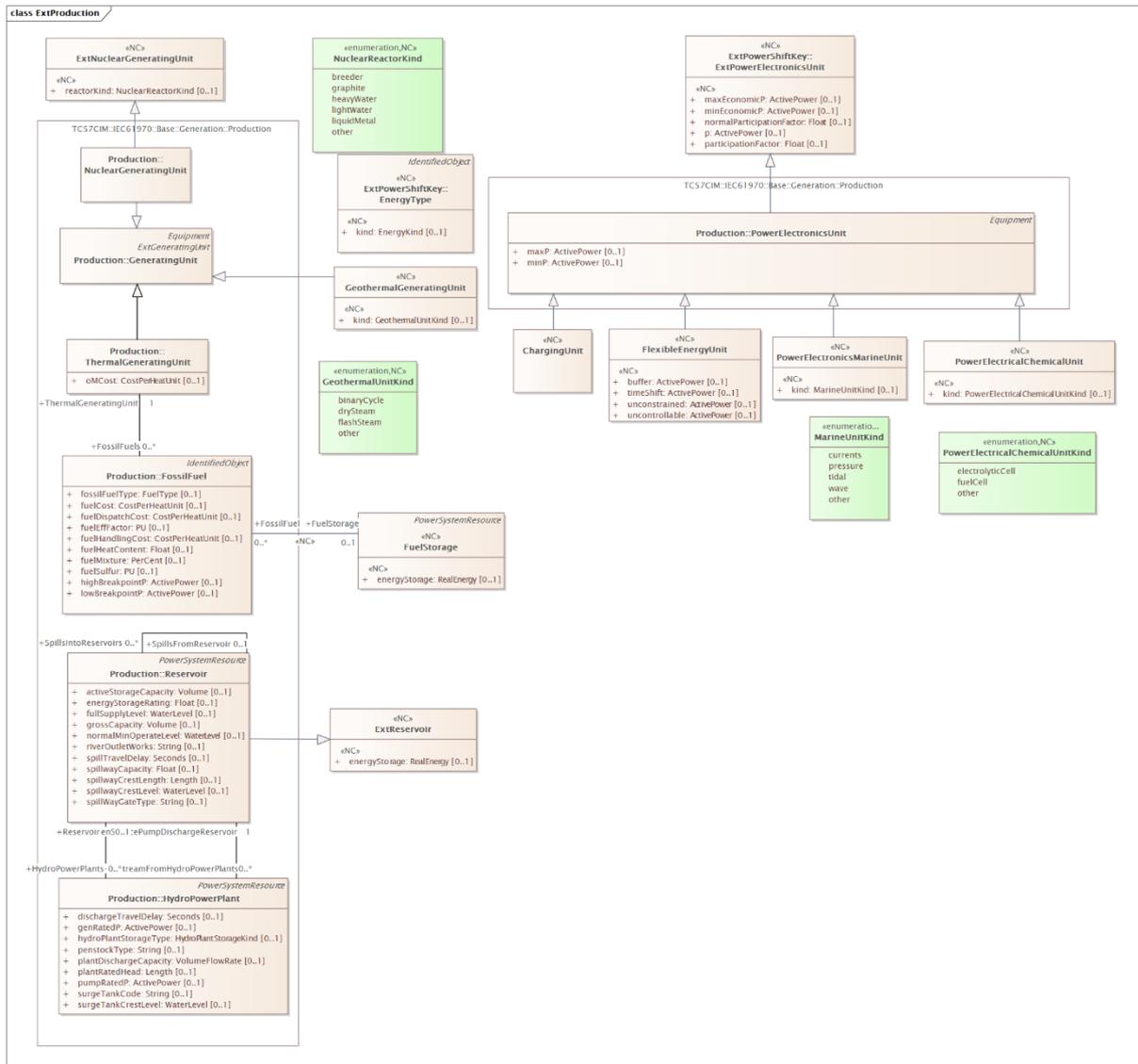
literal	value	description
effectiveReactance		The device injects a voltage proportional to the line current to achieve the specified target value defined by the ImpedanceControlFunction. The voltage will vary according to the line current level.
voltageInjection		The device injects a fixed voltage that is either inductive or capacitive according to the specified target value of the VoltageInjectionControlFunction. The effective reactance varies according to the flow of the line current.
monitoring		The device bypasses and a voltage injection is close to zero. In monitoring mode current is monitored.
currentDroop		The device injects a voltage proportional to the difference between the line current and the target value of the CurrentDroopControlFunction. There are capacitive and inductive operational regions.

3040

3041 **3.6.7 Package ExtProduction**

3042 **3.6.7.1 General**

3043 This package contains the extensions related to the production.



3044  
3045 **Figure 18 – Class diagram ExtProduction::ExtProduction**

3046 Figure 18: The diagram contains classes related to production.

3047 **3.6.7.2 (NC) FuelStorage**

3048 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject  
3049 Fuel storage. e.g. pile of coal that can be shared between multiple thermal generating units.  
3050 Table 244 shows all attributes of FuelStorage.

3051 **Table 244 – Attributes of ExtProduction::FuelStorage**

name	mult	type	description
energyStorage	0..1	RealEnergy	(NC) Amount of energy available in the storage.
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 245 shows all association ends of FuelStorage with other classes.

3054

**Table 245 – Association ends of ExtProduction::FuelStorage with other classes**

mult from	name	mult to	type	description
0..1	FossilFuel	0..*	FossilFuel	(NC) Fossil fuel stored in a fuel storage.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3055

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### 3.6.7.3 (NC) ChargingUnit

3057

Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject : [ExtPowerElectronicsUnit](#)

3058

3059

A unit that supplies electrical power for charging electrical non-stationary entities, e.g. electrical vehicle, trucks, buses, ferries, boats and airplanes. The characteristic is that the energy consumption is highly schedule dependent.

3061

3062

Table 246 shows all attributes of ChargingUnit.

3063

**Table 246 – Attributes of ExtProduction::ChargingUnit**

name	mult	type	description
maxP	0..1	ActivePower	inherited from: PowerElectronicsUnit
minP	0..1	ActivePower	inherited from: PowerElectronicsUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
p	0..1	NullCIM	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
normalParticipationFactor	0..1	Float	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
participationFactor	0..1	Float	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
maxEconomicP	0..1	ActivePower	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
minEconomicP	0..1	ActivePower	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>

3064

3065

Table 247 shows all association ends of ChargingUnit with other classes.

3066

**Table 247 – Association ends of ExtProduction::ChargingUnit with other classes**

mult from	name	mult to	type	description
0..*	PowerElectronicsConnection	1..1	PowerElectronicsConnection	inherited from: PowerElectronicsUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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3068

**3.6.7.4 (NC) ExtNuclearGeneratingUnit root class**

3069

European Network Code extension of NuclearGeneratingUnit.

3070

Table 248 shows all attributes of ExtNuclearGeneratingUnit.

3071

**Table 248 – Attributes of ExtProduction::ExtNuclearGeneratingUnit**

name	mult	type	description
reactorKind	0..1	<a href="#">NuclearReactorKind</a>	(NC) Kind of nuclear reactor.

3072

3073 **3.6.7.5 (NC) ExtReservoir root class**

3074 EU Network Code extension of Reservoir.

3075 Table 249 shows all attributes of ExtReservoir.

3076 **Table 249 – Attributes of ExtProduction::ExtReservoir**

name	mult	type	description
energyStorage	0..1	RealEnergy	(NC) Amount of energy available in the storage.

3077

3078 **3.6.7.6 (NC) FlexibleEnergyUnit**

3079 Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource :

3080 IdentifiedObject : ExtEulIdentifiedObject : [ExtPowerElectronicsUnit](#)

3081 Flexible consumer or embedded producer of energy. The unit cannot be a net producer.

3082 Table 250 shows all attributes of FlexibleEnergyUnit.

3083 **Table 250 – Attributes of ExtProduction::FlexibleEnergyUnit**

name	mult	type	description
uncontrollable	0..1	ActivePower	(NC) The active power, that forms the base consumption for the unit. This is measured and expected consumption. Load sign convention is used, i.e. positive sign means flow out from a node.
timeShift	0..1	ActivePower	(NC) The active power, that can be shifted from one pricing interval (market time unit) to another. It is expected to be a limited on the length of the shift. Example from household could be washing machine or dishwasher. Example from industry is the possible to shut down a machine for the relevant period. Load sign convention is used, i.e. positive sign means flow out from a node.
buffer	0..1	ActivePower	(NC) The active power, that has the flexibility to operate as production and/or consumption. The buffer is bound. Example are heat pump, cooling system, embedded batteries including electric vehicle. Load sign convention is used, i.e. positive sign means flow out from a node.
unconstrained	0..1	ActivePower	(NC) The active power, that has the flexibility to operate as production without any bound by a buffer. Example are alternative heating (wood, gas, diesel etc) or power generators. Load sign convention is used, i.e. positive sign means flow out from a node.
maxP	0..1	ActivePower	inherited from: PowerElectronicsUnit
minP	0..1	ActivePower	inherited from: PowerElectronicsUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
p	0..1	NullCIM	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
normalParticipationFactor	0..1	Float	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
participationFactor	0..1	Float	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
maxEconomicP	0..1	ActivePower	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
minEconomicP	0..1	ActivePower	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>

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3085

Table 251 shows all association ends of FlexibleEnergyUnit with other classes.

3086

**Table 251 – Association ends of ExtProduction::FlexibleEnergyUnit with other classes**

mult from	name	mult to	type	description
0..*	PowerElectronicsConnection	1..1	PowerElectronicsConnection	inherited from: PowerElectronicsUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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**3.6.7.7 (NC) GeothermalGeneratingUnit**

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Inheritance path = GeneratingUnit : Equipment : PowerSystemResource : IdentifiedObject :

3090

ExtEulIdentifiedObject : [ExtGeneratingUnit](#)

3091

Generating unit that is generating electrical power from geothermal energy.

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Table 252 shows all attributes of GeothermalGeneratingUnit.

3093

**Table 252 – Attributes of ExtProduction::GeothermalGeneratingUnit**

name	mult	type	description
kind	0..1	<a href="#">GeothermalUnitKind</a>	(NC) Kind of geothermal generating unit.
allocSpinResP	0..1	ActivePower	inherited from: GeneratingUnit
autoCntrlMarginP	0..1	ActivePower	inherited from: GeneratingUnit

name	mult	type	description
baseP	0..1	ActivePower	inherited from: GeneratingUnit
controlDeadband	0..1	ActivePower	inherited from: GeneratingUnit
controlPulseHigh	0..1	Seconds	inherited from: GeneratingUnit
controlPulseLow	0..1	Seconds	inherited from: GeneratingUnit
controlResponseRate	0..1	ActivePowerChangeRate	inherited from: GeneratingUnit
efficiency	0..1	PerCent	inherited from: GeneratingUnit
genControlMode	0..1	GeneratorControlMode	inherited from: GeneratingUnit
genControlSource	0..1	GeneratorControlSource	inherited from: GeneratingUnit
governorMPL	0..1	PU	inherited from: GeneratingUnit
governorSCD	0..1	PerCent	inherited from: GeneratingUnit
highControlLimit	0..1	ActivePower	inherited from: GeneratingUnit
initialP	0..1	ActivePower	inherited from: GeneratingUnit
longPF	0..1	Float	inherited from: GeneratingUnit
lowControlLimit	0..1	ActivePower	inherited from: GeneratingUnit
lowerRampRate	0..1	ActivePowerChangeRate	inherited from: GeneratingUnit
maxEconomicP	0..1	ActivePower	inherited from: GeneratingUnit
maximumAllowableSpinningReserve	0..1	ActivePower	inherited from: GeneratingUnit
maxOperatingP	0..1	ActivePower	inherited from: GeneratingUnit
minEconomicP	0..1	ActivePower	inherited from: GeneratingUnit
minimumOffTime	0..1	Seconds	inherited from: GeneratingUnit
minOperatingP	0..1	ActivePower	inherited from: GeneratingUnit
modelDetail	0..1	Classification	inherited from: GeneratingUnit
nominalP	0..1	ActivePower	inherited from: GeneratingUnit
normalPF	0..1	Float	inherited from: GeneratingUnit
penaltyFactor	0..1	Float	inherited from: GeneratingUnit
raiseRampRate	0..1	ActivePowerChangeRate	inherited from: GeneratingUnit
ratedGrossMaxP	0..1	ActivePower	inherited from: GeneratingUnit
ratedGrossMinP	0..1	ActivePower	inherited from: GeneratingUnit
ratedNetMaxP	0..1	ActivePower	inherited from: GeneratingUnit
shortPF	0..1	Float	inherited from: GeneratingUnit
startupCost	0..1	Money	inherited from: GeneratingUnit
startupTime	0..1	Seconds	inherited from: GeneratingUnit
tieLinePF	0..1	Float	inherited from: GeneratingUnit
totalEfficiency	0..1	PerCent	inherited from: GeneratingUnit
variableCost	0..1	Money	inherited from: GeneratingUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
maxStartupLoad	0..1	ActivePower	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
participationFactor	0..1	Float	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
shutdownCost	0..1	Money	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
shutdownTime	0..1	Duration	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
normalMustRunP	0..1	ActivePower	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
mustRunP	0..1	ActivePower	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
runningLeadTime	0..1	Duration	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
warmStartupTime	0..1	Duration	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
coolDownTime	0..1	Duration	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
warmStartupCost	0..1	Money	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
startupRampRate	0..1	ActivePowerChangeRate	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
minimumUpTime	0..1	Duration	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
normalStartupCost	0..1	Money	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
normalWarmStartupCost	0..1	Money	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
mustRunQ	0..1	ReactivePower	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
normalMustRunQ	0..1	ReactivePower	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>
mustRun	0..1	Boolean	(NC) inherited from: <a href="#">ExtGeneratingUnit</a>

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Table 253 shows all association ends of GeothermalGeneratingUnit with other classes.

**Table 253 – Association ends of ExtProduction::GeothermalGeneratingUnit with other classes**

mult from	name	mult to	type	description
0..1	RotatingMachine	0..*	RotatingMachine	inherited from: GeneratingUnit
1..1	GenUnitOpCostCurves	0..*	GenUnitOpCostCurve	inherited from: GeneratingUnit
1..1	GenUnitOpSchedule	0..1	GenUnitOpSchedule	inherited from: GeneratingUnit
1..1	ControlAreaGeneratingUnit	0..*	ControlAreaGeneratingUnit	inherited from: GeneratingUnit
1..1	GrossToNetActivePowerCurves	0..*	GrossToNetActivePowerCurve	inherited from: GeneratingUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment

mult from	name	mult to	type	description
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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**3.6.7.8 (NC) PowerElectricalChemicalUnit**

3100 Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource :

3101 IdentifiedObject : ExtEulIdentifiedObject : [ExtPowerElectronicsUnit](#)3102 A unit capable of either generating electrical energy from chemical reactions or using electrical  
3103 energy to cause chemical reactions.

3104 Table 254 shows all attributes of PowerElectricalChemicalUnit.

3105

**Table 254 – Attributes of ExtProduction::PowerElectricalChemicalUnit**

name	mult	type	description
kind	0..1	<a href="#">PowerElectricalChemicalUnitKind</a>	(NC) Kind of power electrical chemical unit.
maxP	0..1	ActivePower	inherited from: PowerElectronicsUnit
minP	0..1	ActivePower	inherited from: PowerElectronicsUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
p	0..1	NullCIM	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
normalParticipationFactor	0..1	Float	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
participationFactor	0..1	Float	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
maxEconomicP	0..1	ActivePower	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
minEconomicP	0..1	ActivePower	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>

3106

3107

Table 255 shows all association ends of PowerElectricalChemicalUnit with other classes.

3108  
3109**Table 255 – Association ends of ExtProduction::PowerElectricalChemicalUnit with other classes**

mult from	name	mult to	type	description
0..*	PowerElectronicsConnection	1..1	PowerElectronicsConnection	inherited from: PowerElectronicsUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3110

**3.6.7.9 (NC) PowerElectronicsMarineUnit**

3112 Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource :  
3113 IdentifiedObject : ExtEulIdentifiedObject : [ExtPowerElectronicsUnit](#)

3114 A unit that capture energy from marine sources, e.g. waves, for generating electrical power.

3115 Table 256 shows all attributes of PowerElectronicsMarineUnit.

3116

**Table 256 – Attributes of ExtProduction::PowerElectronicsMarineUnit**

name	mult	type	description
kind	0..1	<a href="#">MarineUnitKind</a>	(NC) Kind of marine unit.
maxP	0..1	ActivePower	inherited from: PowerElectronicsUnit
minP	0..1	ActivePower	inherited from: PowerElectronicsUnit
aggregate	0..1	Boolean	inherited from: Equipment
inService	0..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment
normallyInService	0..1	Boolean	inherited from: Equipment
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
p	0..1	NullCIM	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
normalParticipationFactor	0..1	Float	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
participationFactor	0..1	Float	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
maxEconomicP	0..1	ActivePower	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>
minEconomicP	0..1	ActivePower	(NC) inherited from: <a href="#">ExtPowerElectronicsUnit</a>

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Table 257 shows all association ends of PowerElectronicsMarineUnit with other classes.

**Table 257 – Association ends of ExtProduction::PowerElectronicsMarineUnit with other classes**

mult from	name	mult to	type	description
0..*	PowerElectronicsConnection	1..1	PowerElectronicsConnection	inherited from: PowerElectronicsUnit
0..*	AggregatedEquipment	0..1	Equipment	(NC) inherited from: Equipment
0..1	OperationalLimitSet	0..*	OperationalLimitSet	inherited from: Equipment
1..1	ContingencyEquipment	0..*	ContingencyEquipment	inherited from: Equipment
0..*	EquipmentContainer	0..1	EquipmentContainer	inherited from: Equipment
0..1	Faults	0..*	Fault	inherited from: Equipment
0..*	AdditionalEquipmentContainer	0..*	EquipmentContainer	inherited from: Equipment
0..1	DetailedModelDynamics	0..*	DetailedModelDynamics	inherited from: Equipment
0..1	DetailedEquipment	0..*	Equipment	(NC) inherited from: Equipment
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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### 3.6.7.10 (NC) GeothermalUnitKind enumeration

Kind of geothermal.

Table 258 shows all literals of GeothermalUnitKind.

3125

**Table 258 – Literals of ExtProduction::GeothermalUnitKind**

literal	value	description
binaryCycle		The moderately hot geothermal water is passed by a secondary fluid with a much lower boiling point than water.
drySteam		Uses geothermal steam of 150 degree Celsius or greater to turn turbines.
flashSteam		Pull deep, high-pressure hot water into lower-pressure tanks and use the resulting flashed steam to drive turbines.
other		Other type of geothermal generating unit.

3126

**3.6.7.11 (NC) MarineUnitKind enumeration**

3128 Kind of marine energy capture.

3129 Table 259 shows all literals of MarineUnitKind.

3130

**Table 259 – Literals of ExtProduction::MarineUnitKind**

literal	value	description
currents		Capture energy from ocean current which are caused by forces like breaking waves, wind, coriolis effect etc.
pressure		Capture energy from pressure.
tidal		Capture energy from tidal power, which captures the energy of the current caused by the gravitational pull of the Sun and Moon.
wave		Capture energy from wind waves.
other		Other way of capture energy from marine elements.

3131

**3.6.7.12 (NC) NuclearReactorKind enumeration**

3133 Kind of nuclear reactor.

3134 Table 260 shows all literals of NuclearReactorKind.

3135

**Table 260 – Literals of ExtProduction::NuclearReactorKind**

literal	value	description
breeder		Reactor whose heat source is a nuclear reactor that generates more fissile material than it consumes.
graphite		Reactor whose heat source is a graphite-moderated reactor that is a nuclear reactor that uses carbon as a neutron moderator, which allows natural uranium to be used as nuclear fuel.
heavyWater		Reactor whose heat source is a pressurized heavy-water reactor (PHWR) that uses heavy water (deuterium oxide D2O) as its coolant and neutron moderator.
lightWater		Reactor whose heat source is a light-water reactor (LWR) that is a type of thermal-neutron reactor that uses normal water, as both its coolant and neutron moderator – furthermore a solid form of fissile elements is used as fuel.

literal	value	description
liquidMetal		Reactor whose liquid metal cooled nuclear reactor, liquid metal fast reactor or LMFR is an advanced type of nuclear reactor where the primary coolant is a liquid metal.
other		Other type of nuclear reactors.

3136

3137 **3.6.7.13 (NC) PowerElectricalChemicalUnitKind enumeration**

3138 Kind of power electrical chemical unit.

3139 Table 261 shows all literals of PowerElectricalChemicalUnitKind.

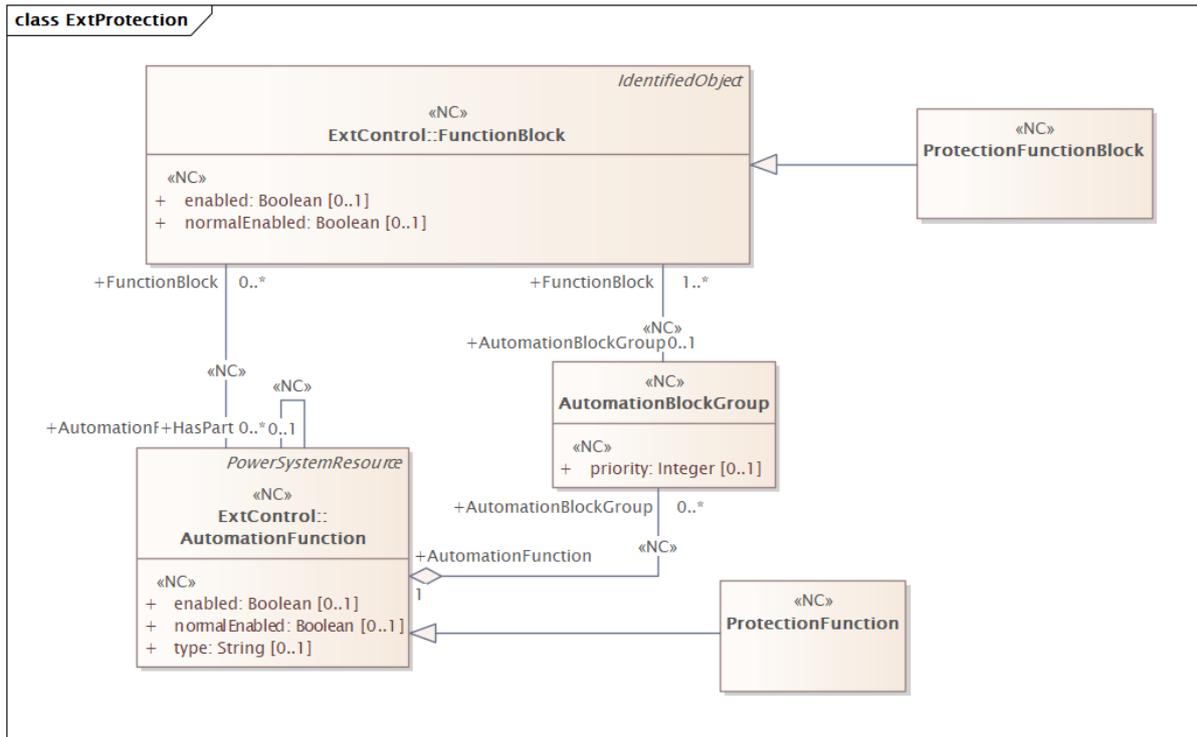
3140 **Table 261 – Literals of ExtProduction::PowerElectricalChemicalUnitKind**

literal	value	description
electrolyticCell		An electrolytic cell is an electrochemical cell that drives a non-spontaneous redox reaction through the application of electrical energy. Example are the decomposition of water into hydrogen and oxygen.
fuelCell		A fuel cell is an electrochemical cell that converts the chemical energy from a fuel into electricity through an electrochemical reaction of hydrogen fuel with oxygen or another oxidizing agent.
other		Other type of cell used in chemical reactions.

3141

3142 **3.6.8 Package ExtProtection**3143 **3.6.8.1 General**

3144 This package contains the extensions related to the protections.



3145

3146

**Figure 19 – Class diagram ExtProtection::ExtProtection**

3147 Figure 19:

3148 **3.6.8.2 (NC) ProtectionFunctionBlock**

3149 Inheritance path = [FunctionBlock](#) : IdentifiedObject : ExtEulIdentifiedObject

3150 Protection function block is a function block that contains an algorithm for protecting the  
3151 equipment.

3152 Table 262 shows all attributes of ProtectionFunctionBlock.

3153

**Table 262 – Attributes of ExtProtection::ProtectionFunctionBlock**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">FunctionBlock</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3154

3155 Table 263 shows all association ends of ProtectionFunctionBlock with other classes.

3156 **Table 263 – Association ends of ExtProtection::ProtectionFunctionBlock with other**  
3157 **classes**

mult from	name	mult to	type	description
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">FunctionBlock</a>

mult from	name	mult to	type	description
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	Input	1..*	<a href="#">FunctionInputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	FunctionOutputVariable	1..*	<a href="#">FunctionOutputVariable</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
1..*	AutomationBlockGroup	0..1	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">FunctionBlock</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3158

### 3159 3.6.8.3 (NC) AutomationBlockGroup root class

3160 Grouping of function block that are operated with the same priority as settings.

3161 Table 264 shows all attributes of AutomationBlockGroup.

3162

**Table 264 – Attributes of ExtProtection::AutomationBlockGroup**

name	mult	type	description
priority	0..1	Integer	(NC) Value 0 means ignore priority. 1 means the highest priority, 2 is the second highest priority.

3163

3164 Table 265 shows all association ends of AutomationBlockGroup with other classes.

**Table 265 – Association ends of ExtProtection::AutomationBlockGroup with other classes**

3166

mult from	name	mult to	type	description
0..1	FunctionBlock	1..*	<a href="#">FunctionBlock</a>	(NC) Function block which belongs to an automation block group.
0..*	AutomationFunction	1..1	<a href="#">AutomationFunction</a>	(NC) Automation function which has automation block group.

3167

### 3168 3.6.8.4 (NC) ProtectionFunction

3169 Inheritance path = [AutomationFunction](#) : PowerSystemResource : IdentifiedObject :  
3170 ExtEulIdentifiedObject

3171 Protection function is an automation function that can protect one or multiple equipment.

3172 Table 266 shows all attributes of ProtectionFunction.

3173

**Table 266 – Attributes of ExtProtection::ProtectionFunction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
type	0..1	String	(NC) inherited from: <a href="#">AutomationFunction</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">AutomationFunction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuidentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuidentifiedObject

3174

3175 Table 267 shows all association ends of ProtectionFunction with other classes.

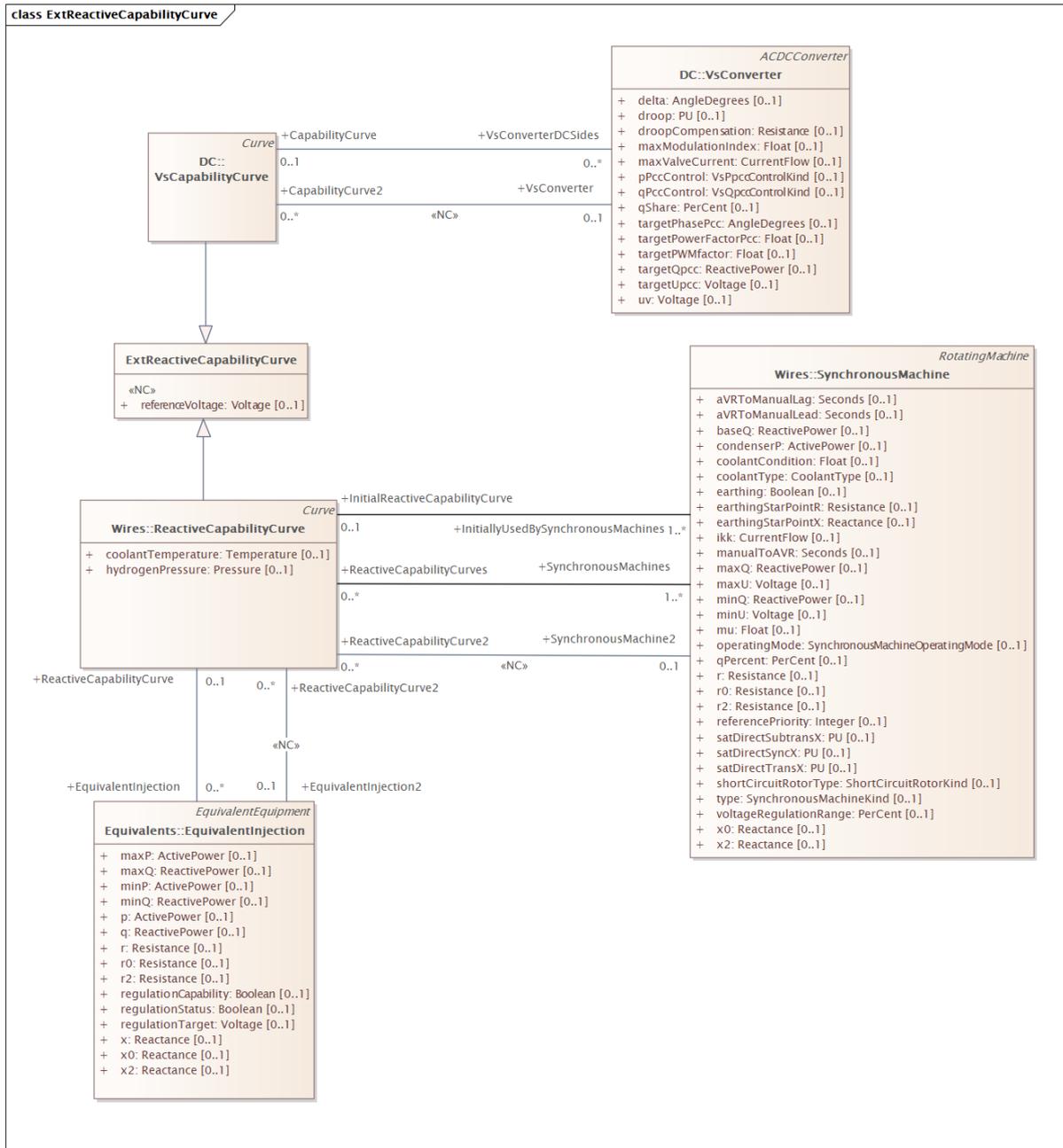
3176 **Table 267 – Association ends of ExtProtection::ProtectionFunction with other classes**

mult from	name	mult to	type	description
1..1	AutomationBlockGroup	0..*	<a href="#">AutomationBlockGroup</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	HasPart	0..*	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..1	FunctionBlock	0..*	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PartOf	0..1	<a href="#">AutomationFunction</a>	(NC) inherited from: <a href="#">AutomationFunction</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3177

3178 **3.6.9 Package ExtReactiveCapabilityCurve**3179 **3.6.9.1 General**

3180 This package contains the extensions related to reactive capability curve.



3181  
3182 **Figure 20 – Class diagram ExtReactiveCapabilityCurve::ExtReactiveCapabilityCurve**

3183 Figure 20: The diagram contains classes related to reactive capability curve.

3184 **3.6.9.2 ExtReactiveCapabilityCurve root class**

3185 European network codes extension to base CIM counterpart.  
3186 Table 268 shows all attributes of ExtReactiveCapabilityCurve.

3187 **Table 268 – Attributes of ExtReactiveCapabilityCurve::ExtReactiveCapabilityCurve**

name	mult	type	description
referenceVoltage	0..1	Voltage	(NC) The reference voltage for which the capability curve is valid.

3188





3208 Table 269 shows all attributes of AmbientTemperatureDependencyCurve.

3209 **Table 269 – Attributes of ExtSecurityLimit::AmbientTemperatureDependencyCurve**

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3210

3211 Table 270 shows all association ends of AmbientTemperatureDependencyCurve with other  
3212 classes.

3213

**Table 270 – Association ends of  
ExtSecurityLimit::AmbientTemperatureDependencyCurve with other classes**

3214

mult from	name	mult to	type	description
0..1	OperationalLimitType	0..*	OperationalLimitType	(NC) The operational limit type that has this permanent ambient temperature dependency curve.
1..1	CurveDatras	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3215

### 3216 3.6.10.3 (NC) BaseOverloadLimitCurve

3217 Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject

3218 A curve or functional relationship between

3219 - the relative loading - current loading over permanent loading (PATL) independent variable (X-  
3220 axis), and

3221 - temporary overloading (TATL) limiting dependent (Y-axis) variables.

3222 Table 271 shows all attributes of BaseOverloadLimitCurve.

3223

**Table 271 – Attributes of ExtSecurityLimit::BaseOverloadLimitCurve**

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3224

3225

Table 272 shows all association ends of BaseOverloadLimitCurve with other classes.

3226

3227

**Table 272 – Association ends of ExtSecurityLimit::BaseOverloadLimitCurve with other classes**

mult from	name	mult to	type	description
0..1	OperationalLimitType	0..*	OperationalLimitType	(NC) The operational limit type that has this temporary base overload limit curve.
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3228

3229

**3.6.10.4 (NC) DurationOverloadLimitCurve**

3230

Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject

3231

A curve or functional relationship between

3232

- the overload duration independent variable (X-axis), and

3233

- temporary overloading (TATL) limiting dependent (Y-axis) variables.

3234

Table 273 shows all attributes of DurationOverloadLimitCurve.

3235

**Table 273 – Attributes of ExtSecurityLimit::DurationOverloadLimitCurve**

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve

name	mult	type	description
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3236

3237

Table 274 shows all association ends of DurationOverloadLimitCurve with other classes.

3238

3239

**Table 274 – Association ends of ExtSecurityLimit::DurationOverloadLimitCurve with other classes**

mult from	name	mult to	type	description
0..1	OperationalLimitType	0..*	OperationalLimitType	(NC) The operational limit type that has this temporary duration overload limit curve.
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3240

3241

### 3.6.10.5 (NC) LimitDependencyCurve

3242

Inheritance path = Curve : IdentifiedObject : ExtEulIdentifiedObject

3243

A curve or functional relationship between an independent variable (X-axis) and limiting dependent (Y-axis) variables.

3244

3245

Table 275 shows all attributes of LimitDependencyCurve.

3246

**Table 275 – Attributes of ExtSecurityLimit::LimitDependencyCurve**

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve

name	mult	type	description
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3247

3248

Table 276 shows all association ends of LimitDependencyCurve with other classes.

3249

**Table 276 – Association ends of ExtSecurityLimit::LimitDependencyCurve with other classes**

3250

mult from	name	mult to	type	description
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3251

3252

### 3.6.10.6 (NC) RecoveryOverloadLimitCurve

3253

Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject

3254

The relation between the recovery time and an overload limit.

3255

Table 277 shows all attributes of RecoveryOverloadLimitCurve.

3256

**Table 277 – Attributes of ExtSecurityLimit::RecoveryOverloadLimitCurve**

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3257

3258

Table 278 shows all association ends of RecoveryOverloadLimitCurve with other classes.

3259

**Table 278 – Association ends of ExtSecurityLimit::RecoveryOverloadLimitCurve with other classes**

3260

mult from	name	mult to	type	description
0..1	OperationalLimitType	0..*	OperationalLimitType	(NC) The operational limit type which has recovery time characteristic.
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3261

3262

### 3.6.10.7 (NC) SolarRadiationDependencyCurve

3263

Inheritance path = [LimitDependencyCurve](#) : Curve : IdentifiedObject : ExtEulIdentifiedObject

3264

A curve or functional relationship between

3265

- the solar radiation independent variable (X-axis), and

3266

- relative dependent (Y-axis) variables.

3267

Table 279 shows all attributes of SolarRadiationDependencyCurve.

3268

**Table 279 – Attributes of ExtSecurityLimit::SolarRadiationDependencyCurve**

name	mult	type	description
curveStyle	0..1	CurveStyle	inherited from: Curve
xMultiplier	0..1	UnitMultiplier	inherited from: Curve
xUnit	0..1	UnitSymbol	inherited from: Curve
y1Multiplier	0..1	UnitMultiplier	inherited from: Curve
y1Unit	0..1	UnitSymbol	inherited from: Curve
y2Multiplier	0..1	UnitMultiplier	inherited from: Curve
y2Unit	0..1	UnitSymbol	inherited from: Curve
y3Multiplier	0..1	UnitMultiplier	inherited from: Curve
y3Unit	0..1	UnitSymbol	inherited from: Curve
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3269

3270

Table 280 shows all association ends of SolarRadiationDependencyCurve with other classes.

3271 **Table 280 – Association ends of ExtSecurityLimit::SolarRadiationDependencyCurve**  
3272 **with other classes**

mult from	name	mult to	type	description
0..1	OperationalLimitType	0..*	OperationalLimitType	(NC) The operational limit type that has this permanent solar radiation curve.
1..1	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3273

### 3274 3.6.10.8 (NC) ExtOperationalLimitType root class

3275 European network codes extension to base CIM counterpart.

3276 Table 281 shows all attributes of ExtOperationalLimitType.

3277 **Table 281 – Attributes of ExtSecurityLimit::ExtOperationalLimitType**

name	mult	type	description
isMinimum	0..1	Boolean	(NC) Defines if the operational limit type is minimum. If true, the value is a minimum value of the same kind. This applies to stability and PATL. If false, the limit has the normal behaviour. OperationalLimitType.direction attribute shall be absoluteValue.

3278

### 3279 3.6.10.9 (NC) InfeedLimit

3280 Inheritance path = OperationalLimit : IdentifiedObject : ExtEulIdentifiedObject

3281 Infeed limit set constraints fed in to the network by two or more terminals.

3282 Table 282 shows all attributes of InfeedLimit.

3283 **Table 282 – Attributes of ExtSecurityLimit::InfeedLimit**

name	mult	type	description
normalValueW	0..1	ActivePower	(NC) The normal value of active power limit. The attribute shall be a positive value or zero.
valueW	0..1	ActivePower	(NC) Value of active power limit. The attribute shall be a positive value or zero.
normalValueA	0..1	CurrentFlow	(NC) The normal current limit. The attribute shall be a positive value or zero.
valueA	0..1	CurrentFlow	(NC) Value of current limit. The attribute shall be a positive value or zero.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3284

3285 Table 283 shows all association ends of InfeedLimit with other classes.

3286 **Table 283 – Association ends of ExtSecurityLimit::InfeedLimit with other classes**

mult from	name	mult to	type	description
0..1	InfeedTerminal	0..*	<a href="#">InfeedTerminal</a>	(NC) Infeed terminal that has infeed constraints.
0..1	InfeedLimitSchedule	0..*	<a href="#">InfeedLimitSchedule</a>	(NC) Infeed limit schedule associated with an infeed limit.
0..*	OperationalLimitSet	1..1	OperationalLimitSet	inherited from: OperationalLimit
0..*	OperationalLimitType	0..1	OperationalLimitType	inherited from: OperationalLimit
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3287

3288 **3.6.10.10 (NC) InfeedTerminal root class**

3289 Infeed terminal defines the terminals that are linked to an infeed limit.

3290 Table 284 shows all attributes of InfeedTerminal.

3291 **Table 284 – Attributes of ExtSecurityLimit::InfeedTerminal**

name	mult	type	description
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

3292

3293 Table 285 shows all association ends of InfeedTerminal with other classes.

3294 **Table 285 – Association ends of ExtSecurityLimit::InfeedTerminal with other classes**

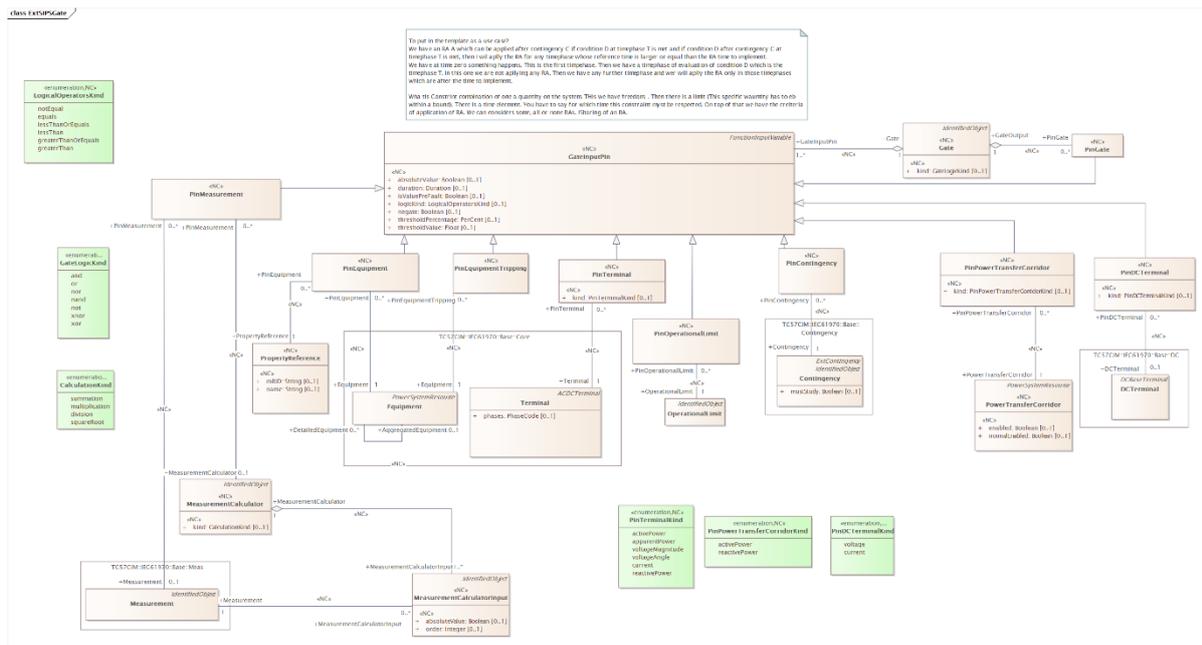
mult from	name	mult to	type	description
0..*	ACDCTerminal	0..1	ACDCTerminal	(NC) ACDCTerminal which is connected to an infeed terminal.
0..*	InfeedConstraint	0..1	<a href="#">InfeedLimit</a>	(NC) Infeed constraint which belongs to an infeed terminal.

3295

3296 **3.6.11 SIPS extensions**3297 **3.6.11.1 General**

3298 This package contains the extensions related to the SIPS which is a kind of remedial action  
 3299 scheme. A remedial action scheme can have different stages. Each stage represents the  
 3300 change of values of one element in the grid model compared to the base case is described by  
 3301 the grid state alteration. Each stage can have multiple triggers that have a priority and one or  
 3302 many conditions. When the condition (gate) is reached, the grid state alteration is activated.  
 3303 A remedial action scheme is a kind of a remedial action. In this way, the remedial action scheme  
 3304 participates in the optimization of the remedial actions.





3308

3309

**Figure 26 – Class diagram ExtSIPSGate**

3310 Figure 26: The diagram contains classes related to SIPS gate.

3311 **3.6.11.2 (NC) Gate**

3312 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3313 Logical gate that supports a logical operation based on the input.

3314 Table 286 shows all attributes of Gate.

3315

**Table 286 – Attributes of ExtSIPSGate**

name	mult	type	description
kind	0..1	<a href="#">GateLogicKind</a>	(NC) The logical operation of the gate.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3316

3317 Table 287 shows all association ends of Gate with other classes.

3318

**Table 287 – Association ends of ExtSIPSGate with other classes**

mult from	name	mult to	type	description
0..1	RemedialActionScheme	0..*	<a href="#">RemedialActionScheme</a>	(NC) The remedial action scheme which has an armed gate.
1..1	PinGate	0..*	<a href="#">PinGate</a>	(NC) The pin for this gate output.
1..1	GateInputPin	1..*	<a href="#">GateInputPin</a>	(NC) This is the input to the gate.
0..1	StageTriggerArmed	0..*	<a href="#">StageTrigger</a>	(NC) The stage trigger associated with the armed gate.

mult from	name	mult to	type	description
0..1	StageTrigger	0..*	<a href="#">StageTrigger</a>	(NC) The stage trigger associated with the gate trigger.
0..1	StageTriggerCom	0..*	<a href="#">StageTrigger</a>	(NC) The stage trigger associated with the communication gate.
1..1	TriggerCondition	0..*	<a href="#">TriggerCondition</a>	(NC) The trigger condition that has a gate trigger.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3319

3320 **3.6.11.3 (NC) GateInputPin**3321 Inheritance path = [FunctionInputVariable](#) : IdentifiedObject : ExtEulIdentifiedObject

3322 Input pin for a logical gate. The condition described in the input pin gives a logical true or false.

3323 The result from measurement and calculation are converted to a true or false.

3324 Table 288 shows all attributes of GateInputPin.

3325

**Table 288 – Attributes of ExtSIPS::GateInputPin**

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) Indicates if the absolute value is used for comparison. If true, use the absolute value. If false, use the complex value (vector).
duration	0..1	Duration	(NC) The time duration for which the condition is satisfied before acting. Default is 0 seconds.
logicKind	0..1	<a href="#">LogicalOperatorsKind</a>	(NC) The logical operator kind used for comparison.
negate	0..1	Boolean	(NC) Invert/negate the result of the comparison.
thresholdPercentage	0..1	PerCent	(NC) The threshold percentage that should be used for compare with the percentage change between input value and threshold value. The allowed value range is [0,100].
thresholdValue	0..1	Float	(NC) The threshold value that should be used for compare with the input value.
isValuePreFault	0..1	Boolean	(NC) Indicates if the gate input pin value is referring to the value prior to a fault (e.g. simulated by a contingency or due to a SIPS activation in a N-x-y case). If it is true, it means that the value is referring to pre-fault. If it is false or not populated, then it is post-fault.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3326

3327 Table 289 shows all association ends of GateInputPin with other classes.

3328 **Table 289 – Association ends of ExtSIPS::GateInputPin with other classes**

mult from	name	mult to	type	description
1..*	Gate	1..1	<a href="#">Gate</a>	(NC) The Gate that has this input.
1..*	Function	0..1	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">FunctionInputVariable</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3329

3330 **3.6.11.4 (NC) GridStateAlterationCollection**

3331 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3332 A collection of grid state alterations.

3333 Table 290 shows all attributes of GridStateAlterationCollection.

3334 **Table 290 – Attributes of ExtSIPS::GridStateAlterationCollection**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3335

3336 Table 291 shows all association ends of GridStateAlterationCollection with other classes.

3337 **Table 291 – Association ends of ExtSIPS::GridStateAlterationCollection with other classes**  
3338

mult from	name	mult to	type	description
0..1	AvailabilitySchedule	0..*	<a href="#">AvailabilitySchedule</a>	(NC) Availability schedule that require the a collection of grid state alteration to provide a valid power flow solution. For instance, a set of switching plans.
0..1	StageAction	0..*	<a href="#">Stage</a>	(NC) The stage action related to this GridStateAlterationCollection.
0..1	GridStateAlteration	0..*	<a href="#">GridStateAlteration</a>	(NC) The GridStateAlteration that belongs to the collection.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3339

3340 **3.6.11.5 (NC) MeasurementCalculator**

3341 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3342 Result of a calculation of one or more measurement.

3343 Table 292 shows all attributes of MeasurementCalculator.

3344 **Table 292 – Attributes of ExtSIPS::MeasurementCalculator**

name	mult	type	description
kind	0..1	<a href="#">CalculationKind</a>	(NC) Calculation operation executed on the operands.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3345

3346 Table 293 shows all association ends of MeasurementCalculator with other classes.

3347 **Table 293 – Association ends of ExtSIPS::MeasurementCalculator with other classes**

mult from	name	mult to	type	description
0..1	PinMeasurement	0..*	<a href="#">PinMeasurement</a>	(NC) The pin that uses this input.
1..1	MeasurementCalculatorInput	1..*	<a href="#">MeasurementCalculatorInput</a>	(NC) The input used for the calculator.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3348

3349 **3.6.11.6 (NC) MeasurementCalculatorInput**

3350 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3351 Input to measurement calculation. It supports Analog, Discrete and Accumulator measurements.

3353 Table 294 shows all attributes of MeasurementCalculatorInput.

3354 **Table 294 – Attributes of ExtSIPS::MeasurementCalculatorInput**

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) Indicates if the absolute value is used for comparison. If true, use the absolute value. If false, use the complex value (vector).
order	0..1	Integer	(NC) Positive number that defines the order of the operand in the calculation. 0 means default in which case the order is not relevant.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3355

3356

Table 295 shows all association ends of MeasurementCalculatorInput with other classes.

3357

3358

**Table 295 – Association ends of ExtSIPS::MeasurementCalculatorInput with other classes**

mult from	name	mult to	type	description
0..*	Measurement	1..1	Measurement	(NC) Measurement used as input to a calculation.
1..*	MeasurementCalculator	1..1	<a href="#">MeasurementCalculator</a>	(NC) The measurement calculator using this calculator input.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3359

3360

### 3.6.11.7 (NC) PinContingency

3361

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :

3362

ExtEulIdentifiedObject

3363

Input pin associated with a Contingency. It is used for comparison.

3364

Table 296 shows all attributes of PinContingency.

3365

**Table 296 – Attributes of ExtSIPS::PinContingency**

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
duration	0..1	Duration	(NC) inherited from: <a href="#">GateInputPin</a>
logicKind	0..1	<a href="#">LogicalOperatorsKind</a>	(NC) inherited from: <a href="#">GateInputPin</a>
negate	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdPercentage	0..1	PerCent	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdValue	0..1	Float	(NC) inherited from: <a href="#">GateInputPin</a>
isValuePreFault	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3366

3367

Table 297 shows all association ends of PinContingency with other classes.

3368

**Table 297 – Association ends of ExtSIPS::PinContingency with other classes**

mult from	name	mult to	type	description
0..*	Contingency	1..1	Contingency	(NC) The Contingency that is used in the input pin.
1..*	Gate	1..1	<a href="#">Gate</a>	(NC) inherited from: <a href="#">GateInputPin</a>
1..*	Function	0..1	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">FunctionInputVariable</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3369

3370

**3.6.11.8 (NC) PinDCTerminal**

3371 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :  
3372 ExtEulIdentifiedObject

3373 Input pin associated with a DCTerminal. It is used for comparison.

3374 Table 298 shows all attributes of PinDCTerminal.

3375

**Table 298 – Attributes of ExtSIPS::PinDCTerminal**

name	mult	type	description
kind	0..1	<a href="#">PinDCTerminalKind</a>	(NC) The kind of quantity which is used as an input value.
absoluteValue	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
duration	0..1	Duration	(NC) inherited from: <a href="#">GateInputPin</a>
logicKind	0..1	<a href="#">LogicalOperatorsKind</a>	(NC) inherited from: <a href="#">GateInputPin</a>
negate	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdPercentage	0..1	PerCent	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdValue	0..1	Float	(NC) inherited from: <a href="#">GateInputPin</a>
isValuePreFault	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3376

3377

Table 299 shows all association ends of PinDCTerminal with other classes.

3378

**Table 299 – Association ends of ExtSIPS::PinDCTerminal with other classes**

mult from	name	mult to	type	description
0..*	DCTerminal	0..1	DCTerminal	(NC) The DC terminal that has this pin DC terminal.
1..*	Gate	1..1	<a href="#">Gate</a>	(NC) inherited from: <a href="#">GateInputPin</a>

mult from	name	mult to	type	description
1..*	Function	0..1	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">FunctionInputVariable</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3379

3380 **3.6.11.9 (NC) PinEquipment**3381 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :

3382 ExtEulIdentifiedObject

3383 Input pin associated with an Equipment. It is used for the comparison.

3384 Table 300 shows all attributes of PinEquipment.

3385

**Table 300 – Attributes of ExtSIPS::PinEquipment**

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
duration	0..1	Duration	(NC) inherited from: <a href="#">GateInputPin</a>
logicKind	0..1	<a href="#">LogicalOperatorsKind</a>	(NC) inherited from: <a href="#">GateInputPin</a>
negate	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdPercentage	0..1	PerCent	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdValue	0..1	Float	(NC) inherited from: <a href="#">GateInputPin</a>
isValuePreFault	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3386

3387 Table 301 shows all association ends of PinEquipment with other classes.

3388

**Table 301 – Association ends of ExtSIPS::PinEquipment with other classes**

mult from	name	mult to	type	description
0..*	Equipment	1..1	Equipment	(NC) The Equipment that is used in the input pin.
0..*	PropertyReference	1..1	<a href="#">PropertyReference</a>	(NC) The property reference for this pin equipment.
1..*	Gate	1..1	<a href="#">Gate</a>	(NC) inherited from: <a href="#">GateInputPin</a>
1..*	Function	0..1	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">FunctionInputVariable</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3389

3390 **3.6.11.10 (NC) PinEquipmentTripping**

3391 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :  
3392 ExtEulIdentifiedObject

3393 Input pin associated with an Equipment. It is used to determine if the equipment is tripped  
3394 between two consecutive stages, i.e. the equipment is in service at pre-fault stage and it is out  
3395 of service at post-fault stage.

3396 Table 302 shows all attributes of PinEquipmentTripping.

3397 **Table 302 – Attributes of ExtSIPS::PinEquipmentTripping**

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
duration	0..1	Duration	(NC) inherited from: <a href="#">GateInputPin</a>
logicKind	0..1	<a href="#">LogicalOperatorsKind</a>	(NC) inherited from: <a href="#">GateInputPin</a>
negate	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdPercentage	0..1	PerCent	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdValue	0..1	Float	(NC) inherited from: <a href="#">GateInputPin</a>
isValuePreFault	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3398

3399 Table 303 shows all association ends of PinEquipmentTripping with other classes.

3400 **Table 303 – Association ends of ExtSIPS::PinEquipmentTripping with other classes**

mult from	name	mult to	type	description
0..*	Equipment	1..1	Equipment	(NC) Equipment that is tripped.
1..*	Gate	1..1	<a href="#">Gate</a>	(NC) inherited from: <a href="#">GateInputPin</a>
1..*	Function	0..1	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">FunctionInputVariable</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3401

3402 **3.6.11.11 (NC) PinGate**

3403 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :  
3404 ExtEulIdentifiedObject

3405 An output from one gate represents an input to another gate.

3406 Table 304 shows all attributes of PinGate.

3407 **Table 304 – Attributes of ExtSIPS::PinGate**

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
duration	0..1	Duration	(NC) inherited from: <a href="#">GateInputPin</a>
logicKind	0..1	<a href="#">LogicalOperatorsKind</a>	(NC) inherited from: <a href="#">GateInputPin</a>
negate	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdPercentage	0..1	PerCent	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdValue	0..1	Float	(NC) inherited from: <a href="#">GateInputPin</a>
isValuePreFault	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3408

3409 Table 305 shows all association ends of PinGate with other classes.

3410 **Table 305 – Association ends of ExtSIPS::PinGate with other classes**

mult from	name	mult to	type	description
0..*	GateOutput	1..1	<a href="#">Gate</a>	(NC) The output of the gate.
1..*	Gate	1..1	<a href="#">Gate</a>	(NC) inherited from: <a href="#">GateInputPin</a>
1..*	Function	0..1	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">FunctionInputVariable</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3411

3412 **3.6.11.12 (NC) PinMeasurement**

3413 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :  
3414 ExtEulIdentifiedObject

3415 Input pin associated with a Measurement. It is used for comparison.

3416 Table 306 shows all attributes of PinMeasurement.

3417 **Table 306 – Attributes of ExtSIPS::PinMeasurement**

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>

name	mult	type	description
duration	0..1	Duration	(NC) inherited from: <a href="#">GateInputPin</a>
logicKind	0..1	<a href="#">LogicalOperatorsKind</a>	(NC) inherited from: <a href="#">GateInputPin</a>
negate	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdPercentage	0..1	PerCent	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdValue	0..1	Float	(NC) inherited from: <a href="#">GateInputPin</a>
isValuePreFault	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3418

3419

Table 307 shows all association ends of PinMeasurement with other classes.

3420

**Table 307 – Association ends of ExtSIPS::PinMeasurement with other classes**

mult from	name	mult to	type	description
0..*	Measurement	0..1	Measurement	(NC) The Measurement that is used in the input pin.
0..*	MeasurementCalculator	0..1	<a href="#">MeasurementCalculator</a>	(NC) The result of the calculation used as input to a gate.
1..*	Gate	1..1	<a href="#">Gate</a>	(NC) inherited from: <a href="#">GateInputPin</a>
1..*	Function	0..1	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">FunctionInputVariable</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3421

### 3.6.11.13 (NC) PinPowerTransferCorridor

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :

ExtEulIdentifiedObject

Input pin associated with a PowerTransferCorridor. It is used for comparison.

Table 308 shows all attributes of PinPowerTransferCorridor.

3427

**Table 308 – Attributes of ExtSIPS::PinPowerTransferCorridor**

name	mult	type	description
kind	0..1	<a href="#">PinPowerTransferCorridorKind</a>	(NC) The kind of quantity which is used as an input value.
absoluteValue	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
duration	0..1	Duration	(NC) inherited from: <a href="#">GateInputPin</a>
logicKind	0..1	<a href="#">LogicalOperatorsKind</a>	(NC) inherited from: <a href="#">GateInputPin</a>
negate	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>

name	mult	type	description
thresholdPercentage	0..1	PerCent	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdValue	0..1	Float	(NC) inherited from: <a href="#">GateInputPin</a>
isValuePreFault	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3428

3429 Table 309 shows all association ends of PinPowerTransferCorridor with other classes.

3430 **Table 309 – Association ends of ExtSIPS::PinPowerTransferCorridor with other classes**

mult from	name	mult to	type	description
0..*	PowerTransferCorridor	1..1	<a href="#">PowerTransferCorridor</a>	(NC) The PowerTransferCorridor that is used in the input pin.
1..*	Gate	1..1	<a href="#">Gate</a>	(NC) inherited from: <a href="#">GateInputPin</a>
1..*	Function	0..1	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">FunctionInputVariable</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3431

3432 **3.6.11.14 (NC) PinTerminal**3433 Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :  
3434 ExtEulIdentifiedObject

3435 Input pin associated with a Terminal. It is used for comparison.

3436 Table 310 shows all attributes of PinTerminal.

3437 **Table 310 – Attributes of ExtSIPS::PinTerminal**

name	mult	type	description
kind	0..1	<a href="#">PinTerminalKind</a>	(NC) The kind of quantity which is used as an input value.
absoluteValue	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
duration	0..1	Duration	(NC) inherited from: <a href="#">GateInputPin</a>
logicKind	0..1	<a href="#">LogicalOperatorsKind</a>	(NC) inherited from: <a href="#">GateInputPin</a>
negate	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdPercentage	0..1	PerCent	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdValue	0..1	Float	(NC) inherited from: <a href="#">GateInputPin</a>
isValuePreFault	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3438

3439

Table 311 shows all association ends of PinTerminal with other classes.

3440

**Table 311 – Association ends of ExtSIPS::PinTerminal with other classes**

mult from	name	mult to	type	description
0..*	Terminal	1..1	Terminal	(NC) The Terminal that is used in the input pin.
1..*	Gate	1..1	<a href="#">Gate</a>	(NC) inherited from: <a href="#">GateInputPin</a>
1..*	Function	0..1	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">FunctionInputVariable</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3441

3442

### 3.6.11.15 (NC) PinOperationalLimit

3443

Inheritance path = [GateInputPin](#) : [FunctionInputVariable](#) : IdentifiedObject :

3444

ExtEulIdentifiedObject

3445

Input pin associated with the limits of a Terminal. It is used for comparison.

3446

Table 312 shows all attributes of PinOperationalLimit.

3447

**Table 312 – Attributes of ExtSIPS::PinOperationalLimit**

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
duration	0..1	Duration	(NC) inherited from: <a href="#">GateInputPin</a>
logicKind	0..1	<a href="#">LogicalOperatorsKind</a>	(NC) inherited from: <a href="#">GateInputPin</a>
negate	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdPercentage	0..1	PerCent	(NC) inherited from: <a href="#">GateInputPin</a>
thresholdValue	0..1	Float	(NC) inherited from: <a href="#">GateInputPin</a>
isValuePreFault	0..1	Boolean	(NC) inherited from: <a href="#">GateInputPin</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3448

3449

Table 313 shows all association ends of PinOperationalLimit with other classes.

3450 **Table 313 – Association ends of ExtSIPS::PinOperationalLimit with other classes**

mult from	name	mult to	type	description
0..*	OperationalLimit	1..1	OperationalLimit	(NC) The operational limit that is used in the input pin.
1..*	Gate	1..1	<a href="#">Gate</a>	(NC) inherited from: <a href="#">GateInputPin</a>
1..*	Function	0..1	<a href="#">FunctionBlock</a>	(NC) inherited from: <a href="#">FunctionInputVariable</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3451

3452 **3.6.11.16 (NC) PTCActivePowerSupport root class**

3453 Defines the active power capability (support) of the scheme in relation to a  
3454 PowerTransferCorridor.

3455 Table 314 shows all attributes of PTCActivePowerSupport.

3456 **Table 314 – Attributes of ExtSIPS::PTCActivePowerSupport**

name	mult	type	description
maximum	0..1	ActivePower	(NC) Maximum support that a System Integrity Protection Scheme (SIPS) can provide to a Power Transfer Corridor (PTC). This is normally limited by the maximum power system disconnect allowed.
normal	0..1	ActivePower	(NC) Normal support that a System Integrity Protection Scheme (SIPS) is expected to provide when enabled to a Power Transfer Corridor (PTC).
value	0..1	ActivePower	(NC) The support that a System Integrity Protection Scheme (SIPS) gives to a Power Transfer Corridor (PTC).

3457

3458 Table 315 shows all association ends of PTCActivePowerSupport with other classes.

3459 **Table 315 – Association ends of ExtSIPS::PTCActivePowerSupport with other classes**

mult from	name	mult to	type	description
0..*	RemedialActionScheme	1..1	<a href="#">RemedialActionScheme</a>	(NC) The RemedialActionScheme which has active power support from the PowerTransferCorridor.
0..*	PowerTransferCorridor	1..1	<a href="#">PowerTransferCorridor</a>	(NC) The PowerTransferCorridor that has a specific active power support.

3460

3461 **3.6.11.17 (NC) RemedialActionScheme**

3462 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject  
3463 Remedial Action Scheme (RAS), Special Protection Schemes (SPS), System Protection  
3464 Schemes (SPS) or System Integrity Protection Schemes (SIPS).

3465 A Remedial Action Scheme consists of one or more stages that can trigger and execute a  
3466 protection action.

3467 Table 316 shows all attributes of RemedialActionScheme.

3468 **Table 316 – Attributes of ExtSIPS::RemedialActionScheme**

name	mult	type	description
armed	0..1	Boolean	(NC) Defines the arming status of the remedial action scheme. It is set by operation or by signal.
kind	0..1	<a href="#">RemedialActionSchemeKind</a>	(NC) Kind of Remedial Action Scheme.
normalArmed	0..1	Boolean	(NC) Defines the normal arming status of the remedial action scheme.
inService	0..1	Boolean	(NC) Specifies the availability of the Remedial Action Scheme (RAS). If true, the RAS is available for contingency processing. If false, the RAS is treated by contingency processing as if it is not in the model.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3469

3470 Table 317 shows all association ends of RemedialActionScheme with other classes.

3471 **Table 317 – Association ends of ExtSIPS::RemedialActionScheme with other classes**

mult from	name	mult to	type	description
0..1	SchemeRemedialAction	0..1	<a href="#">SchemeRemedialAction</a>	(NC) Scheme remedial action that belongs to the remedial action scheme.
0..1	AvailabilityRemedialActionScheme	0..*	<a href="#">AvailabilityRemedialActionScheme</a>	(NC) Availability remedial action scheme describe the availabilitiy that affect this remedial action scheme.
0..*	GateArmed	0..1	<a href="#">Gate</a>	(NC) Gate that through a gate logic and input pin defines arming of a Remedial Action Scheme.
1..1	PTCActivePowerSupport	0..*	<a href="#">PTCActivePowerSupport</a>	(NC) The active power support of the PowerTransferCorridor related to this RemedialActionScheme.
0..1	RemedialActionSchemeSchedule	0..*	<a href="#">RemedialActionSchemeSchedule</a>	(NC) Remedial action scheme schedule that has this armed remedial action.
1..1	TriggerCondition	0..*	<a href="#">TriggerCondition</a>	(NC) The triggering condition of this Remedial Action Scheme.
1..1	Stage	1..*	<a href="#">Stage</a>	(NC) The stage for this remedial action scheme.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

mult from	name	mult to	type	description
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3472

3473 **3.6.11.18 (NC) Stage**

3474 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3475 Stage of a remedial action scheme.

3476 Table 318 shows all attributes of Stage.

3477

**Table 318 – Attributes of ExtSIPS::Stage**

name	mult	type	description
priority	0..1	Integer	(NC) The priority of the stage. 0 = do not care (default) 1 = highest priority. 2 is less than 1 and so on. A stage with higher priority needs be activated before a lower stage can be activated.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3478

3479 Table 319 shows all association ends of Stage with other classes.

3480

**Table 319 – Association ends of ExtSIPS::Stage with other classes**

mult from	name	mult to	type	description
1..*	RemedialActionScheme	1..1	<a href="#">RemedialActionScheme</a>	(NC) The remedial action scheme that has a stage.
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) The GridStateAlterationCollection which belongs to the Stage.
1..1	StageTrigger	1..*	<a href="#">StageTrigger</a>	(NC) The state trigger that is part of this stage.
0..1	RemedialActionApplied	0..*	<a href="#">RemedialActionApplied</a>	(NC) The applied relationship between remedial action and a power flow result.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3481

3482 **3.6.11.19 (NC) StageTrigger**

3483 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

3484 Stage that is triggered either by TriggerCondition or by gate condition within a stage.

3485 Table 320 shows all attributes of StageTrigger.

3486

**Table 320 – Attributes of ExtSIPS::StageTrigger**

name	mult	type	description
armed	0..1	Boolean	(NC) The status of the class set by operation or by signal. Optional field that will override other status fields.
normalArmed	0..1	Boolean	(NC) The default/normal value used when other active signal/values are missing.
priority	0..1	Integer	(NC) Priority of trigger. 0 = don t care (default) 1 = highest priority. 2 is less than 1 and so on. A trigger with the highest priority will trigger first.
inService	0..1	Boolean	(NC) Indicates if the stage trigger is in service.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3487

3488

Table 321 shows all association ends of StageTrigger with other classes.

3489

**Table 321 – Association ends of ExtSIPS::StageTrigger with other classes**

mult from	name	mult to	type	description
0..*	GateArmed	0..1	<a href="#">Gate</a>	(NC) The gate that is the input pin which defines arming of the StageTrigger.
0..*	GateTrigger	0..1	<a href="#">Gate</a>	(NC) The gate that is the input pin which triggers the protective reactions.
0..*	GateComCondition	0..1	<a href="#">Gate</a>	(NC) The gate that is the input pin which defines a communication condition.
1..*	Stage	1..1	<a href="#">Stage</a>	(NC) The stage that has this stage trigger.
1..1	StageTriggerSchedule	0..*	<a href="#">StageTriggerSchedule</a>	(NC) Stage trigger schedule associated with a stage trigger.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3490

**3.6.11.20 (NC) TriggerCondition**

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

The condition that triggers a remedial action scheme.

Table 322 shows all attributes of TriggerCondition.

3495

**Table 322 – Attributes of ExtSIPS::TriggerCondition**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3496

3497

Table 323 shows all association ends of TriggerCondition with other classes.

3498

**Table 323 – Association ends of ExtSIPS::TriggerCondition with other classes**

mult from	name	mult to	type	description
0..*	GateTrigger	1..1	<a href="#">Gate</a>	(NC) The gate that is the condition for the trigger.
0..*	RemedialActionScheme	1..1	<a href="#">RemedialActionScheme</a>	(NC) The remedial action scheme that has the trigger condition.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3499

3500

**3.6.11.21 (NC) CalculationKind enumeration**

3501

Kind of calculation operation that can be done to Measurement.

3502

Table 324 shows all literals of CalculationKind.

3503

**Table 324 – Literals of ExtSIPS::CalculationKind**

literal	value	description
summation		Summation operation on the input values (operands).
multiplication		Multiplication operation on the input values (operands).
division		Division operation on the input values (operands).
squareRoot		Square root operator - only one input value (operands).

3504

3505

**3.6.11.22 (NC) GateLogicKind enumeration**

3506

Define the different logical operations.

3507

Table 325 shows all literals of GateLogicKind.

3508

**Table 325 – Literals of ExtSIPS::GateLogicKind**

literal	value	description
and		A logical AND operation. True when all inputs are true.

literal	value	description
or		A logical OR operation. True when one or more inputs are true.
nor		A logical NOR operation. False when one or more inputs are true.
nand		A logical NAND operation. False when all inputs are true.
not		A logical NOT operation. Only one input and true input will give false out and false in will give true out. An inverter.
xnor		A logical XNOR operation. The function is the inverse of the exclusive OR (XOR) gate. All input false or true will give true. Otherwise false.
xor		A logical XOR operation. All input false or true will give false. Otherwise true.

3509

### 3510 3.6.11.23 (NC) LogicalOperatorsKind enumeration

3511 Kinds of logical operators for comparison.

3512 Table 326 shows all literals of LogicalOperatorsKind.

3513 **Table 326 – Literals of ExtSIPS::LogicalOperatorsKind**

literal	value	description
notEqual		Not equal (unlike) comparison operation.
equals		Equals (like) comparison operation.
lessThanOrEquals		Less than or equals comparison operation.
lessThan		Less than comparison operation.
greaterThanOrEquals		Greater than or equals comparison operation.
greaterThan		Greater than comparison operation.

3514

### 3515 3.6.11.24 (NC) PinDCTerminalKind enumeration

3516 The kind of quantities that can serve as an input value for the DCTerminal pin.

3517 Table 327 shows all literals of PinDCTerminalKind.

3518 **Table 327 – Literals of ExtSIPS::PinDCTerminalKind**

literal	value	description
voltage		Direct current voltage in the DCTerminal.
current		Direct current in the DCTerminal.

3519

### 3520 3.6.11.25 (NC) PinPowerTransferCorridorKind enumeration

3521 The kind of quantities that can serve as an input value for the PowerTransferCorridor pin.

3522 Table 328 shows all literals of PinPowerTransferCorridorKind.

3523 **Table 328 – Literals of ExtSIPS::PinPowerTransferCorridorKind**

literal	value	description
activePower		Active power in the branch group.
reactivePower		Reactive power in the branch group.

3524

3525 **3.6.11.26 (NC) PinTerminalKind enumeration**

3526 The kind of quantities that can serve as an input value for the pin.

3527 Table 329 shows all literals of PinTerminalKind.

3528 **Table 329 – Literals of ExtSIPS::PinTerminalKind**

literal	value	description
activePower		Active power on the Terminal.
apparentPower		Apparent power on the Terminal.
voltageMagnitude		Voltage magnitude on the Terminal.
voltageAngle		Voltage angle on the Terminal.
current		Current on the Terminal.
reactivePower		Reactive power on the Terminal.

3529

3530 **3.6.11.27 (NC) RemedialActionSchemeKind enumeration**

3531 Classification of Remedial Action Scheme.

3532 Table 330 shows all literals of RemedialActionSchemeKind.

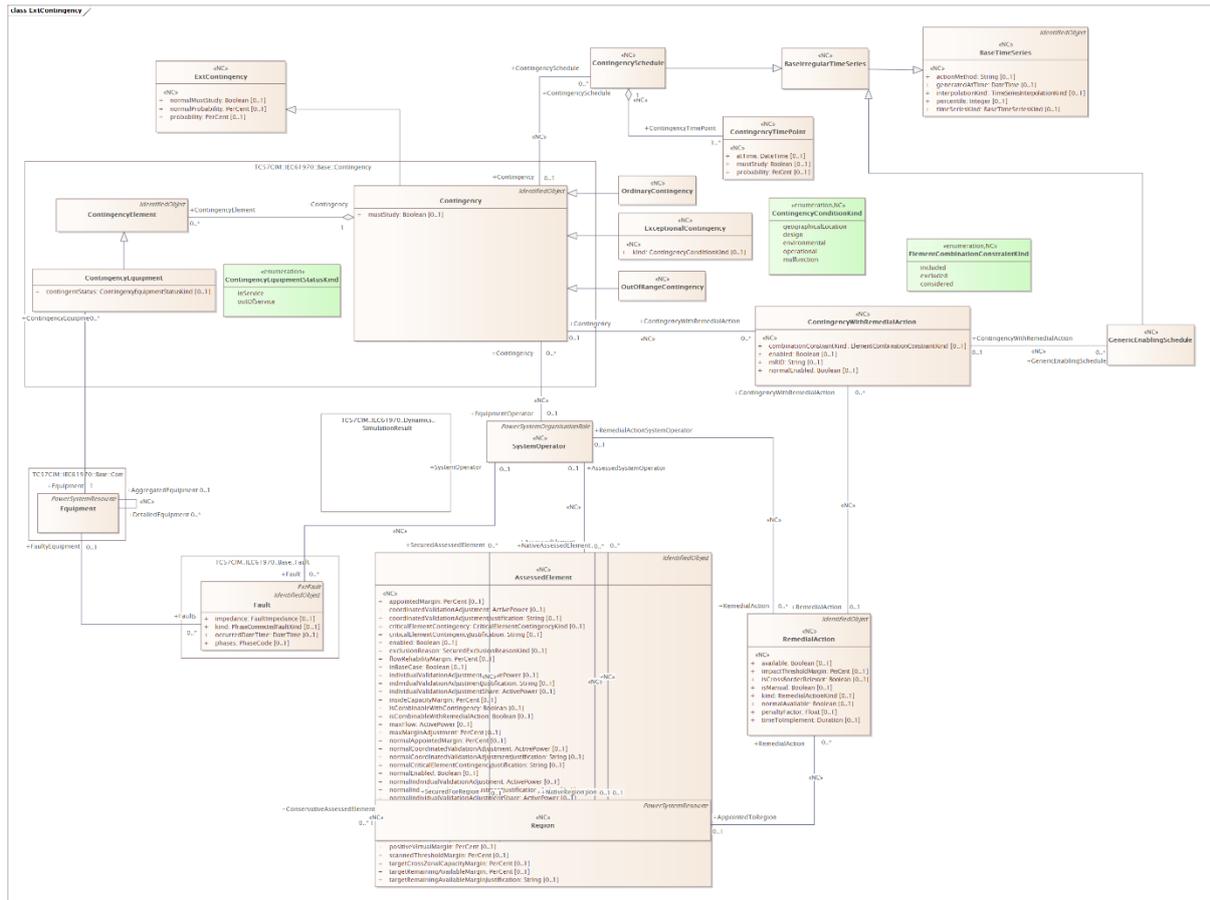
3533 **Table 330 – Literals of ExtSIPS::RemedialActionSchemeKind**

literal	value	description
sips		System Integrity Protection Scheme (SIPS). The triggering conditions are met through field measurements.
rasp		Remedial Action Schema Plan (RASP). The triggering conditions are met through calculation or manual intervention.

3534

3535 **3.7 Contingency extensions**3536 **3.7.1 General**

3537 This package contains the extensions related to the contingency.



3538

3539

**Figure 27 – Class diagram ExtContingency::ExtContingency**

3540 Figure 27: The diagram contains classes related to the contingency.

3541 **3.7.2 (NC) ContingencyWithRemedialAction root class**

3542 Combination of a contingency and a remedial action. ContingencyWithRemedialAction shall not  
3543 be instantiated for preventive RemedialAction (RemedialAction.kind equals  
3544 RemedialActionKind.preventive).

3545 Table 331 shows all attributes of ContingencyWithRemedialAction.

3546

**Table 331 – Attributes of ExtContingency::ContingencyWithRemedialAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) If true, the contingency with remedial action is enabled, otherwise it is disabled.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
combinationConstraintKind	0..1	<a href="#">ElementCombinationConstraintKind</a>	(NC) Defines the combination constraint of the Contingency and Remedial Action. If included, this remedial action can only be applied for this contingency. Else if excluded, this remedial

name	mult	type	description
			action should not be used for this contingency. Else if considered, this remedial action can be considered for this contingency.
normalEnabled	0..1	Boolean	(NC) If true, the contingency with remedial action is enabled, otherwise it is disabled under normal operating conditions.

3547

3548 Table 332 shows all association ends of ContingencyWithRemedialAction with other classes.

3549 **Table 332 – Association ends of ExtContingency::ContingencyWithRemedialAction with**  
3550 **other classes**

mult from	name	mult to	type	description
0..*	Contingency	0..1	Contingency	(NC) The contingency that is associated with a remedial action, i.e. the contingency that is the cause for the creation of a remedial action and justifies it or would usually be resolved with a remedial action.
0..*	RemedialAction	0..1	<a href="#">RemedialAction</a>	(NC) The remedial action defined for this contingency and remedial action combination.
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) Enabling schedule associated to a contingency with remedial action.

3551

3552 **3.7.3 (NC) ExceptionalContingency**3553 Inheritance path = Contingency : IdentifiedObject : ExtEulIdentifiedObject : [ExtContingency](#)3554 Exceptional contingency means the simultaneous occurrence of multiple contingencies with a  
3555 common cause.

3556 Table 333 shows all attributes of ExceptionalContingency.

3557 **Table 333 – Attributes of ExtContingency::ExceptionalContingency**

name	mult	type	description
kind	0..1	<a href="#">ContingencyConditionKind</a>	(NC) Defines the kind of relevance and criteria of application of the exceptional contingency.
mustStudy	0..1	Boolean	inherited from: Contingency
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
normalProbability	0..1	PerCent	(NC) inherited from: <a href="#">ExtContingency</a>
normalMustStudy	0..1	Boolean	(NC) inherited from: <a href="#">ExtContingency</a>
probability	0..1	PerCent	(NC) inherited from: <a href="#">ExtContingency</a>

3558

3559 Table 334 shows all association ends of ExceptionalContingency with other classes.

3560 **Table 334 – Association ends of ExtContingency::ExceptionalContingency with other**  
3561 **classes**

mult from	name	mult to	type	description
1..1	ContingencyElement	0..*	ContingencyElement	inherited from: Contingency
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3562

### 3563 3.7.4 (NC) ExtContingency root class

3564 Specifies the forecasted probability of the occurrence of the contingency based on the given  
3565 operational condition, status of the equipment and the forecasted environment condition.

3566 Table 335 shows all attributes of ExtContingency.

3567 **Table 335 – Attributes of ExtContingency::ExtContingency**

name	mult	type	description
normalProbability	0..1	PerCent	(NC) Normal probability of the occurrence of the contingency based on normal operational condition. The value is used as the default if the probability is missing. The allowed value range is [0,100].
normalMustStudy	0..1	Boolean	(NC) Specifies the requirement of study the contingency under normal operating conditions. True means the contingency must be study in a normal scenario. False means that the contingency does not need to be included in the scenario. This is the default value if mustStudy is missing.
probability	0..1	PerCent	(NC) The forecasted probability of the occurrence of the contingency based on the given operational condition, status of the equipment and the forecasted environment condition. The allowed value range is [0,100].

3568

### 3569 3.7.5 (NC) OrdinaryContingency

3570 Inheritance path = Contingency : IdentifiedObject : ExtEulIdentifiedObject : [ExtContingency](#)

3571 Ordinary contingency means the occurrence of a contingency of a single branch or injection.

3572 Table 336 shows all attributes of OrdinaryContingency.

3573 **Table 336 – Attributes of ExtContingency::OrdinaryContingency**

name	mult	type	description
mustStudy	0..1	Boolean	inherited from: Contingency
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
normalProbability	0..1	PerCent	(NC) inherited from: <a href="#">ExtContingency</a>
normalMustStudy	0..1	Boolean	(NC) inherited from: <a href="#">ExtContingency</a>
probability	0..1	PerCent	(NC) inherited from: <a href="#">ExtContingency</a>

3574  
3575  
3576  
3577

Table 337 shows all association ends of OrdinaryContingency with other classes.

**Table 337 – Association ends of ExtContingency::OrdinaryContingency with other classes**

mult from	name	mult to	type	description
1..1	ContingencyElement	0..*	ContingencyElement	inherited from: Contingency
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3578

### 3.7.6 (NC) OutOfRangeContingency

3579 Inheritance path = Contingency : IdentifiedObject : ExtEulIdentifiedObject : [ExtContingency](#)  
3580 Out of range means the simultaneous occurrence of multiple contingencies without a common  
3581 cause, or a loss of power generating modules with a total loss of generation capacity exceeding  
3582 the reference incident.  
3583

3584 Table 338 shows all attributes of OutOfRangeContingency.

3585

**Table 338 – Attributes of ExtContingency::OutOfRangeContingency**

name	mult	type	description
mustStudy	0..1	Boolean	inherited from: Contingency
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
normalProbability	0..1	PerCent	(NC) inherited from: <a href="#">ExtContingency</a>
normalMustStudy	0..1	Boolean	(NC) inherited from: <a href="#">ExtContingency</a>
probability	0..1	PerCent	(NC) inherited from: <a href="#">ExtContingency</a>

3586

3587 Table 339 shows all association ends of OutOfRangeContingency with other classes.

**Table 339 – Association ends of ExtContingency::OutOfRangeContingency with other classes**

mult from	name	mult to	type	description
1..1	ContingencyElement	0..*	ContingencyElement	inherited from: Contingency

3588  
3589

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3590

3591 **3.7.7 (NC) ContingencyConditionKind enumeration**

3592 Kinds of occurrence criteria of application.

3593 Table 340 shows all literals of ContingencyConditionKind.

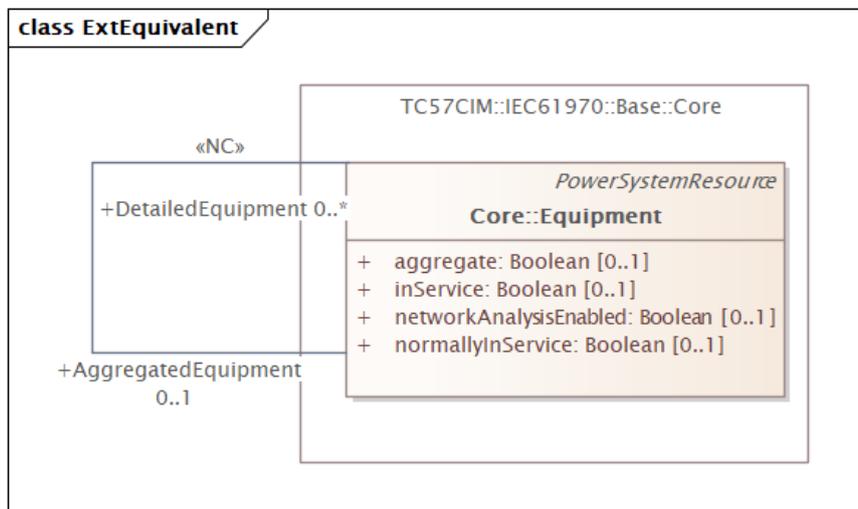
3594 **Table 340 – Literals of ExtContingency::ContingencyConditionKind**

literal	value	description
geographicalLocation		Permanent occurrence factor which is specific geographical location.
design		Permanent occurrence factor which is design condition.
environmental		Temporary occurrence factor which is weather or environmental condition (e.g. storm).
operational		Temporary occurrence factor which is operational condition.
malfunction		Temporary occurrence factor which is life time or generic malfunction affecting the risk of failure condition.

3595

3596 **3.8 Package ExtEquivalent**

3597 This package contains the extensions related to the equivalents.



3598

3599 **Figure 28 – Class diagram ExtEquivalent::ExtEquivalent**

3600 Figure 28: The diagram contains association related to equipment.

3601 **3.9 Package ExtFaultsPRA**

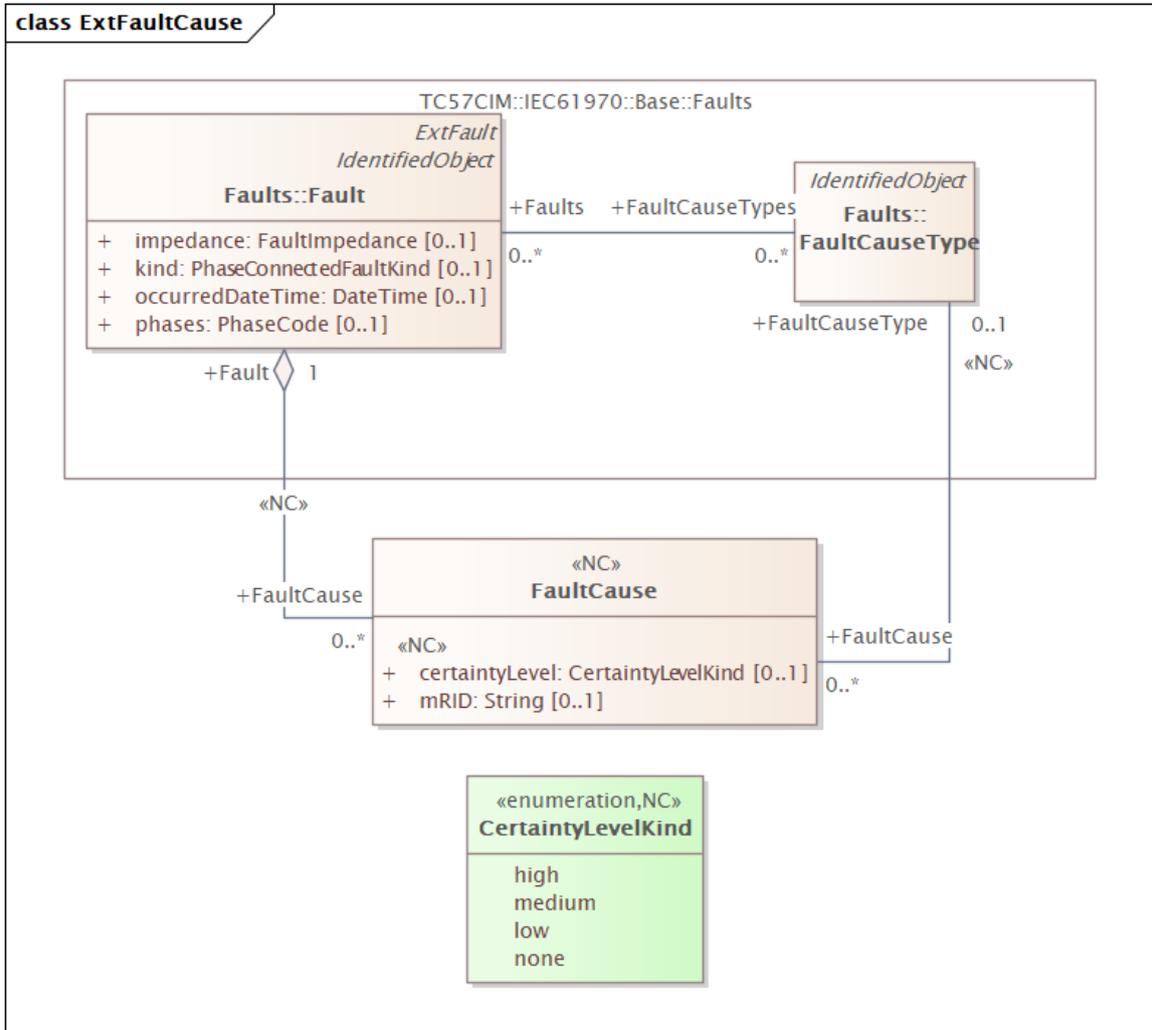
3602 **3.9.1 General**

3603 The package includes extensions related to reporting fault situations in the power system.

3604 **3.9.2 Package ExtFaultCause**

3605 **3.9.2.1 General**

3606 Extensions related to fault cause.



3607

3608 **Figure 29 – Class diagram ExtFaultCause::ExtFaultCause**

3609 Figure 29: The diagram contains classes and attributes related to the extensions.

3610 **3.9.2.2 (NC) FaultCause root class**

3611 Fault cause.

3612 Table 341 shows all attributes of FaultCause.

3613 **Table 341 – Attributes of ExtFaultCause::FaultCause**

name	mult	type	description
certaintyLevel	0..1	<a href="#">CertaintyLevelKind</a>	(NC) The degree of certainty of which the cause of a fault is determined by a user.

name	mult	type	description
			Note 1: the used certainty levels are low, medium and high. High certainty level is used when the cause of a fault is 100 % certain or when the cause is the most probable cause and potentially determined by an expert. Medium certainty level is used when the cause of the fault is very probable but there is not enough evidence to fully support the claim. Low certainty level is used when there is some idea of what the cause could be with the help of, for example, the fault details or expert knowledge. Note 2: the fault cause 'unknown' is used if no other fault cause can be chosen by any degree of certainty.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

3614

3615 Table 342 shows all association ends of FaultCause with other classes.

3616 **Table 342 – Association ends of ExtFaultCause::FaultCause with other classes**

mult from	name	mult to	type	description
0..*	Fault	1..1	Fault	(NC) The fault defined for this fault and cause combination.
0..*	FaultCauseType	0..1	FaultCauseType	(NC) The fault and cause combination to be simulated for this cause.

3617

3618 **3.9.2.3 (NC) CertaintyLevelKind enumeration**

3619 High certainty level is used when the cause of a fault is 100 % certain or when the cause is the most probable cause and potentially determined by an expert.

3620 Table 343 shows all literals of CertaintyLevelKind.

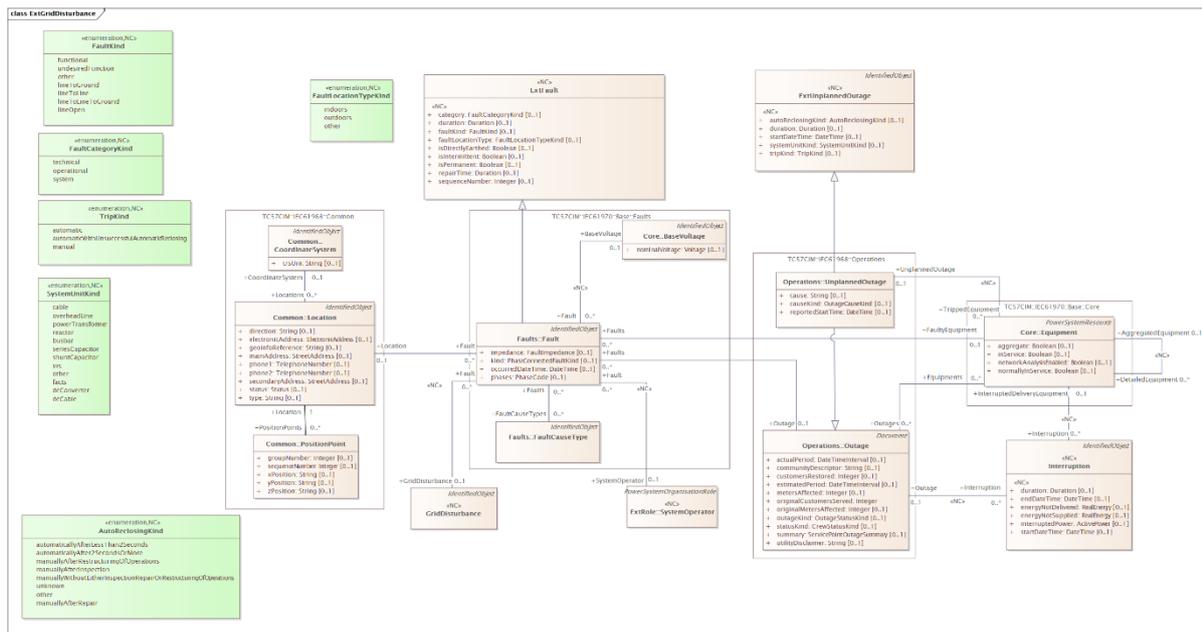
3622 **Table 343 – Literals of ExtFaultCause::CertaintyLevelKind**

literal	value	description
high		The certainty level is high.
medium		The certainty level is medium.
low		The certainty level is low.
none		The certainty level is none.

3623

3624 **3.9.3 Package ExtGridDisturbance**3625 **3.9.3.1 General**

3626 Extensions relate to grid disturbance.



3627  
3628 **Figure 30 – Class diagram ExtGridDisturbance::ExtGridDisturbance**

3629 Figure 30: The diagram contains classes and attributes related to the extensions.

3630 **3.9.3.2 (NC) FaultLocationTypeKind enumeration**

3631 Categories of fault location types.

3632 Table 344 shows all literals of FaultLocationTypeKind.

3633 **Table 344 – Literals of ExtGridDisturbance::FaultLocationTypeKind**

literal	value	description
indoors		Fault occurs indoors.
outdoors		Fault occurs outdoors.
other		Fault occurs in other location.

3634  
3635 **3.9.3.3 (NC) ExtFault root class**

3636 A fault of a component is defined as the inability to perform as required, due to an internal state.

3637 Table 345 shows all attributes of ExtFault.

3638 **Table 345 – Attributes of ExtGridDisturbance::ExtFault**

name	mult	type	description
category	0..1	<a href="#">FaultCategoryKind</a>	(NC) The fault category.
duration	0..1	Duration	(NC) The duration of the fault.
faultKind	0..1	<a href="#">FaultKind</a>	(NC) One fault can consist of several fault types. If a fault consists of several fault types, the most significant fault type is used.  In case of developing faults, that is in faults changing from one type to another, the final type is given.
isIntermittent	0..1	Boolean	(NC) The kind of occurrence of the fault. It is either intermittent (true) or non-intermittent (false).  An intermittent fault is a recurring fault in the same unit and in the same place and for the

name	mult	type	description
			<p>same reason which repeats itself before it becomes necessary to carry out any repairs or eliminate the cause [8].</p> <p>A non-intermittent fault occurs only once.</p> <p>Note 1: a fault which repeats itself after an inspection, which did not result in the fault being pinpointed or repaired, is not considered an intermittent fault. A fault like this is considered as the beginning of a grid disturbance every time the fault occurs.</p> <p>Note 2: one example of an intermittent fault is galloping lines.</p> <p>Note 3: when deciding whether a fault is intermittent or not, one should consider more of the cause, location and consequence of the fault and not on the time between the faults. An intermittent fault is counted as one fault. However, all individual caused outages are connected to this fault.</p> <p>Note 4: there is no standard for the required timespan between intermittent faults. Some system operators use 2 hours.</p>
repairTime	0..1	Duration	<p>(NC) Time from when repair commences, including necessary troubleshooting, until the unit's function(s) has (have) been resumed and the unit is ready for operation.</p> <p>Note 1: repair time is registered only for permanent faults and does not include administrative delays (voluntary waiting time). However, any preparations necessary to carry out repairs, for example the collection or ordering of spare parts, waiting for spare parts or transport, are included in the repair time.</p> <p>Note 2: the repair time is zero if a fault is left unrepaired deliberately.</p> <p>Note 3: this definition differs from the IEC 192-07-19 definition by also including the preparation time necessary to carry out the repairs mentioned in note 1.</p>
sequenceNumber	0..1	Integer	<p>(NC) A chronological serial number indicating the order of the faults related to the grid disturbance.</p> <p>Primary faults have fault ID "1", and secondary/latent faults have fault ID "2" or more.</p>
isDirectlyEarthed	0..1	Boolean	<p>(NC) Whether the power system is directly earthed (true) or compensated (false).</p> <p>Usually optional for faults on units with reactive compensation with voltages lower than 100 kV.</p>
isPermanent	0..1	Boolean	<p>(NC) Whether the fault is a permanent (true) or a temporary (false) fault.</p> <p>A permanent fault is a fault that will remain unless it is removed by some intervention.</p> <p>Note 1 to entry: The "intervention" may be modification or maintenance.</p> <p>Note 2: a permanent fault requires repair or adjustment before the unit is ready for operation. For example, the resetting of computers is considered as repair work and a switch in the wrong position is considered as a permanent fault. Signal acknowledgement is not considered as repair work.</p>

name	mult	type	description
			<p>Note 3: the duration of the disconnection is irrelevant when determining if a fault is permanent or not.</p> <p>A temporary fault is a fault where the unit or component is undamaged and is restored to service by switching operations without repair but possibly with on-site inspection.</p> <p>Note 1: a temporary fault does not require measures other than the reconnection of circuit breakers, replacement of fuses or signal acknowledgement.</p> <p>Note 2: the duration of the disconnection is irrelevant when determining if a fault is temporary or not. If, for example, a fault results in long-term disconnection and (on-site) inspection cannot pinpoint its source, the fault is considered to be temporary as no repairs are carried out.</p>
faultLocationType	0..1	<a href="#">FaultLocationTypeKind</a>	(NC) Fault location type.

3639

3640 **3.9.3.4 (NC) ExtUnplannedOutage**

3641 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3642 An event where a component or unit gets partially or fully isolated from the system.

3643 Table 346 shows all attributes of ExtUnplannedOutage.

3644

**Table 346 – Attributes of ExtGridDisturbance::ExtUnplannedOutage**

name	mult	type	description
startDateTime	0..1	DateTime	(NC) The date and time at which the unplanned outage occurred.
duration	0..1	Duration	(NC) The duration of the unplanned outage.
tripKind	0..1	<a href="#">TripKind</a>	<p>(NC) Whether the type of the trip due to the outage was automatic, automatic with successful automatic reclosing or manual.</p> <p>In case of a fault in the reclosing automatics resulting in lack of reclosing, automatic should be chosen as an alternative.</p>
autoReclosingKind	0..1	<a href="#">AutoReclosingKind</a>	<p>(NC) The type of autoreclosing that occurred with the trip.</p> <p>If high-speed automatic reclosing is successful at one end of a line, but the line needs to be reclosed manually at the other end, choose manual reclosing.</p> <p>In this document, high-speed automatic reclosing refers to automatic reclosing after less than 2 seconds.</p>
systemUnitKind	0..1	<a href="#">SystemUnitKind</a>	<p>(NC) The type of system unit of the component affected by the outage.</p> <p>A system unit is defined as: A group of components which are delimited by one or more circuit breakers.</p> <p>Note 1: the system unit concept has been defined to simplify the calculation of availability. While a system unit is always delimited by circuit breakers, an individual component may not always be. A system unit may therefore contain more than one component.</p> <p>Note 2: the circuit breakers are not included in the system unit.</p>

name	mult	type	description
			Note 3: a tripped element is synonymous to a tripped system unit. Note 4: the type of a system unit is determined by its dominant component. The available system unit types are power transformer, overhead line, cable, reactor, busbar, series capacitor, shunt capacitor and SVC. Note 5: when a system unit is no longer transporting or supplying electrical energy, the system unit is affected by an outage. The system unit is unavailable after the outage has occurred.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3645

3646

Table 347 shows all association ends of ExtUnplannedOutage with other classes.

3647

**Table 347 – Association ends of ExtGridDisturbance::ExtUnplannedOutage with other classes**

3648

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3649

3650

### 3.9.3.5 (NC) GridDisturbance

3651

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3652

Automatic, unintended, or manual undeferrable switching of breakers as a result of faults in the power grid.

3653

3654

Table 348 shows all attributes of GridDisturbance.

3655

**Table 348 – Attributes of ExtGridDisturbance::GridDisturbance**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3656

3657

Table 349 shows all association ends of GridDisturbance with other classes.

3658  
3659**Table 349 – Association ends of ExtGridDisturbance::GridDisturbance with other classes**

mult from	name	mult to	type	description
0..1	Fault	0..*	Fault	(NC) Faults that are related to one grid disturbance.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3660

**3.9.3.6 (NC) Interruption**

3662 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3663 Disappearance of the supply voltage at a delivery point.

3664 Table 350 shows all attributes of Interruption.

3665

**Table 350 – Attributes of ExtGridDisturbance::Interruption**

name	mult	type	description
duration	0..1	Duration	(NC) The duration of the interruption.
endDateTime	0..1	DateTime	(NC) The end date time of the interruption.
energyNotDelivered	0..1	RealEnergy	(NC) The estimated energy which would have been delivered through the delivery point if no interruption and no transmission restrictions had occurred.
energyNotSupplied	0..1	RealEnergy	(NC) The estimated energy which would have been supplied to end-users if no interruption and no transmission restrictions had occurred.
interruptedPower	0..1	ActivePower	(NC) The estimated power that was delivered through the delivery point when the interruption occurred.
startDateTime	0..1	DateTime	(NC) The date and time at which the interruption occurred.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3666

3667 Table 351 shows all association ends of Interruption with other classes.

3668

**Table 351 – Association ends of ExtGridDisturbance::Interruption with other classes**

mult from	name	mult to	type	description
0..*	InterruptedDeliveryEquipment	0..1	Equipment	(NC) The delivery point (equipment) that is affected by the interruption. It is an equipment, power transformer or busbar in the grid where electricity is exchanged.

mult from	name	mult to	type	description
0..*	Outage	0..1	Outage	(NC) One outage may have multiple interruptions.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3669

3670 **3.9.3.7 (NC) AutoReclosingKind enumeration**

3671 The type of autoreclosing that occurred with the trip.

3672 If high-speed automatic reclosing is successful at one end of a line, but the line needs to be reclosed manually at the other end, choose manual reclosing.

3673 In this document, high-speed automatic reclosing refers to automatic reclosing after less than 2 seconds.

3674 Table 352 shows all literals of AutoReclosingKind.

3677

**Table 352 – Literals of ExtGridDisturbance::AutoReclosingKind**

literal	value	description
automaticallyAfterLessThan2Seconds		If the automatic reclosing was successful in 2 seconds or less. Also known as "successful high-speed reclosing".
automaticallyAfter2SecondsOrMore		If the automatic reclosing was successful in 2 seconds or more. Also known as "successful high-speed reclosing".
manuallyAfterRestructuringOfOperations		If the reclosing was done manually after restructuring of operations.
manuallyAfterInspection		If the reclosing was done manually after inspection of the component.
manuallyWithoutEitherInspectionRepairOrRestructuringOfOperations		If the reclosing was done manually without any inspections, repairs or restructurings of operations.
unknown		If the type of auto-reclosing is unknown.
other		If the type of auto-reclosing is not unknown but does not fit the other categories, report it as other.
manuallyAfterRepair		If the reclosing was done manually after repair.

3678

3679 **3.9.3.8 (NC) FaultCategoryKind enumeration**

3680 Available kinds of fault categories.

3681 Table 353 shows all literals of FaultCategoryKind.

3682

**Table 353 – Literals of ExtGridDisturbance::FaultCategoryKind**

literal	value	description
technical		A fault due to a technical error.
operational		A fault due to a temporary human error. Note 1: incorrect operation is considered a fault in a component, or in other words, the incorrect

literal	value	description
		operation is attributed to the unit which has been operated incorrectly.
system		A fault due to off-nominal parameters, exceeding of regulated norms and standards, or exceeding protection limits. Note 1: Typical examples of system fault causes are high/low frequency, power oscillations, overload, overvoltage, undervoltage or high harmonic content in voltage or current. Common causes for system faults are significant changes in load or generation and switching of lines or transformers with following change of load flow.

3683

3684 **3.9.3.9 (NC) FaultKind enumeration**

3685 One fault can consist of several fault types. If a fault consists of several fault types, the most  
3686 significant fault type is used.

3687 In case of developing faults, that is in faults changing from one type to another, the final type  
3688 is given.

3689 Table 354 shows all literals of FaultKind.

3690

**Table 354 – Literals of ExtGridDisturbance::FaultKind**

literal	value	description
functional		The components main function failed to occur.
undesiredFunction		If the component's main function occurred correctly but had an undesired result, that is, the fault. Is only stated if the component is a circuit breaker, disconnector or control system.
other		For example, geomagnetic currents, SSR, capacitor bank imbalances, bad contact, overheating.
lineToGround		The fault connects the indicated phases to ground. The line to line fault impedance is not used and assumed infinite. The full ground impedance is connected between each phase specified in the fault and ground, but not between the phases.
lineToLine		The fault connects the specified phases together without a connection to ground. The ground impedance of this fault is ignored. The line to line impedance is connected between each of the phases specified in the fault. For example three times for a three phase fault, one time for a two phase fault. A single phase fault should not be specified.
lineToLineToGround		The fault connects the indicated phases to ground and to each other. The line to line impedance is connected between each of the phases specified in the fault in a full mesh. For example three times for a three phase fault, one time for a two phase fault. A single phase fault should not be specified. The full ground impedance is connected between each phase specified in the fault and ground.
lineOpen		The fault is when the conductor path is broken between two terminals. Additional coexisting faults may be required if the broken conductor also causes connections to grounds or other lines or phases.

3691

3692 **3.9.3.10 (NC) SystemUnitKind enumeration**

3693 A system unit is defined as:

3694 A group of components which are delimited by one or more circuit breakers.

3695 Note 1: the system unit concept has been defined to simplify the calculation of availability. While  
3696 a system unit is always delimited by circuit breakers, an individual component may not always  
3697 be. A system unit may therefore contain more than one component.

3698 Note 2: the circuit breakers are not included in the system unit.

3699 Note 3: a tripped element is synonymous to a tripped system unit.

3700 Note 4: the type of a system unit is determined by its dominant component. The available system  
3701 unit types are power transformer, overhead line, cable, reactor, busbar, series capacitor, shunt  
3702 capacitor and SVC.3703 Note 5: when a system unit is no longer transporting or supplying electrical energy, the system  
3704 unit is affected by an outage. The system unit is unavailable after the outage has occurred.

3705 Table 355 shows all literals of SystemUnitKind.

3706

**Table 355 – Literals of ExtGridDisturbance::SystemUnitKind**

literal	value	description
cable		If the main function of the system unit is cable.
overheadLine		If the main function of the system unit is overhead line.
powerTransformer		If the main function of the system unit is power transformer.
reactor		If the main function of the system unit is reactor.
busbar		If the main function of the system unit is busbar.
seriesCapacitor		If the main function of the system unit is series capacitor.
shuntCapacitor		If the main function of the system unit is shunt capacitor.
svc		If the main function of the system unit is static var compensator (SVC).
other		If it is of other kind.
facts		If the main function of the system unit is FACTS.
dcConverter		If the main function of the system unit is DCCConverter.
dcCable		If the main function of the system unit is DCCable.

3707

3708 **3.9.3.11 (NC) TripKind enumeration**3709 Whether the type of the trip due to the outage was automatic, automatic with successful  
3710 automatic reclosing or manual.3711 In case of a fault in the reclosing automatics resulting in lack of reclosing, automatic should be  
3712 chosen as an alternative.

3713 Table 356 shows all literals of TripKind.

3714

**Table 356 – Literals of ExtGridDisturbance::TripKind**

literal	value	description
automatic		The trip that resulted in the outage was automatic.

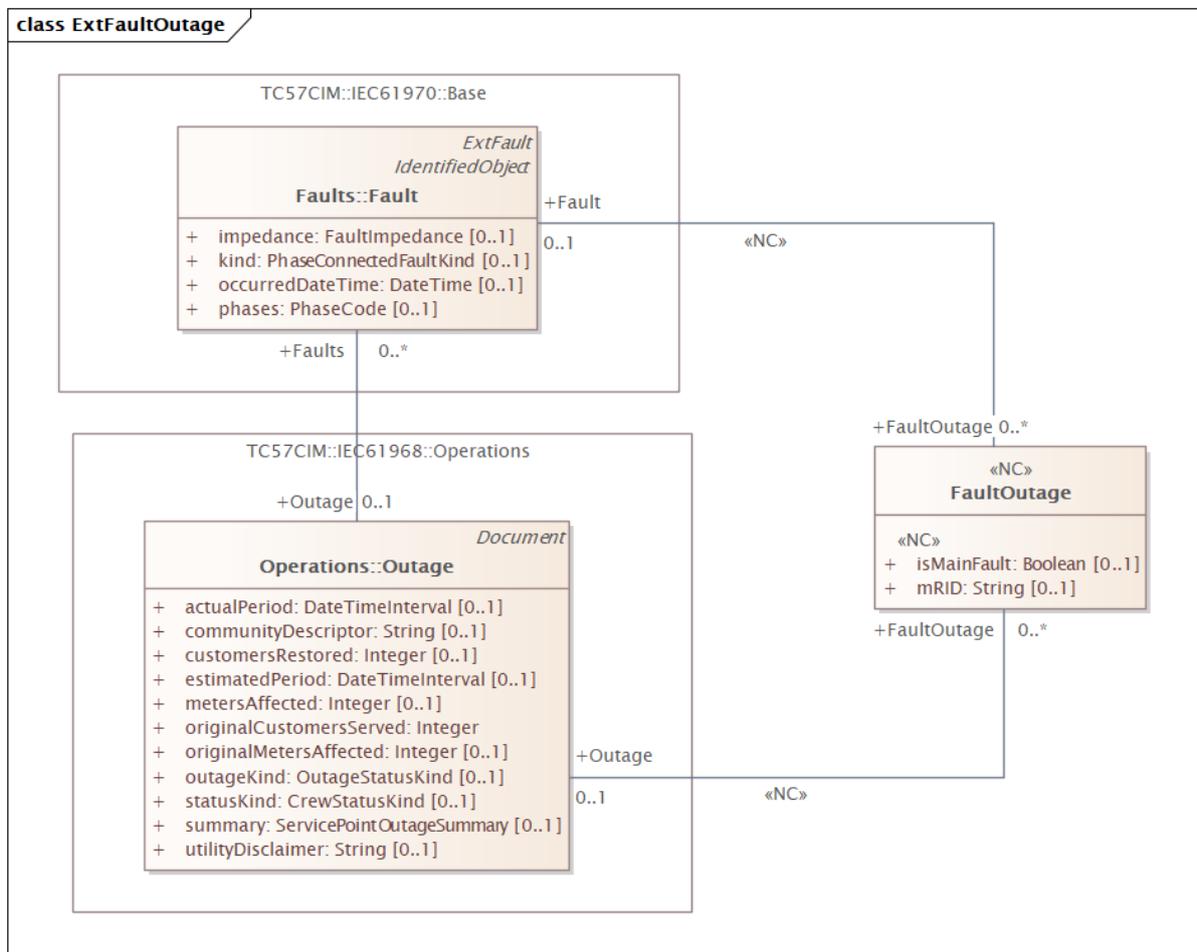
literal	value	description
		In case of a fault in the reclosing automatics resulting in lack of reclosing, automatic should be chosen as an alternative.
automaticWithUnsuccessfulAutomaticReclosing		The trip that resulted in an outage was correctly initiated but the automatic reclosing was unsuccessful.  In case of a fault in the reclosing automatics resulting in lack of reclosing, automatic should be chosen as an alternative.
manual		The trip that resulted in the outage was manually cleared.

3715

3716 **3.9.4 Package ExtFaultOutage**

3717 **3.9.4.1 General**

3718 Extensions related to fault outage.



3719

3720 **Figure 31 – Class diagram ExtFaultOutage::ExtFaultOutage**

3721 Figure 31: The diagram contains classes and attributes related to the extensions.

3722 **3.9.4.2 (NC) FaultOutage root class**

3723 Association class for relating one fault and one outage.

3724 Table 357 shows all attributes of FaultOutage.

3725

**Table 357 – Attributes of ExtFaultOutage::FaultOutage**

name	mult	type	description
isMainFault	0..1	Boolean	(NC) If true the fault outage is the main fault.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

3726

3727

Table 358 shows all association ends of FaultOutage with other classes.

3728

**Table 358 – Association ends of ExtFaultOutage::FaultOutage with other classes**

mult from	name	mult to	type	description
0..*	Fault	0..1	Fault	(NC) The fault defined for this combination of a fault and an outage.
0..*	Outage	0..1	Outage	(NC) The outage defined for this combination of a fault and an outage.

3729

3730

### 3.10 Package ExtPowerShiftKey

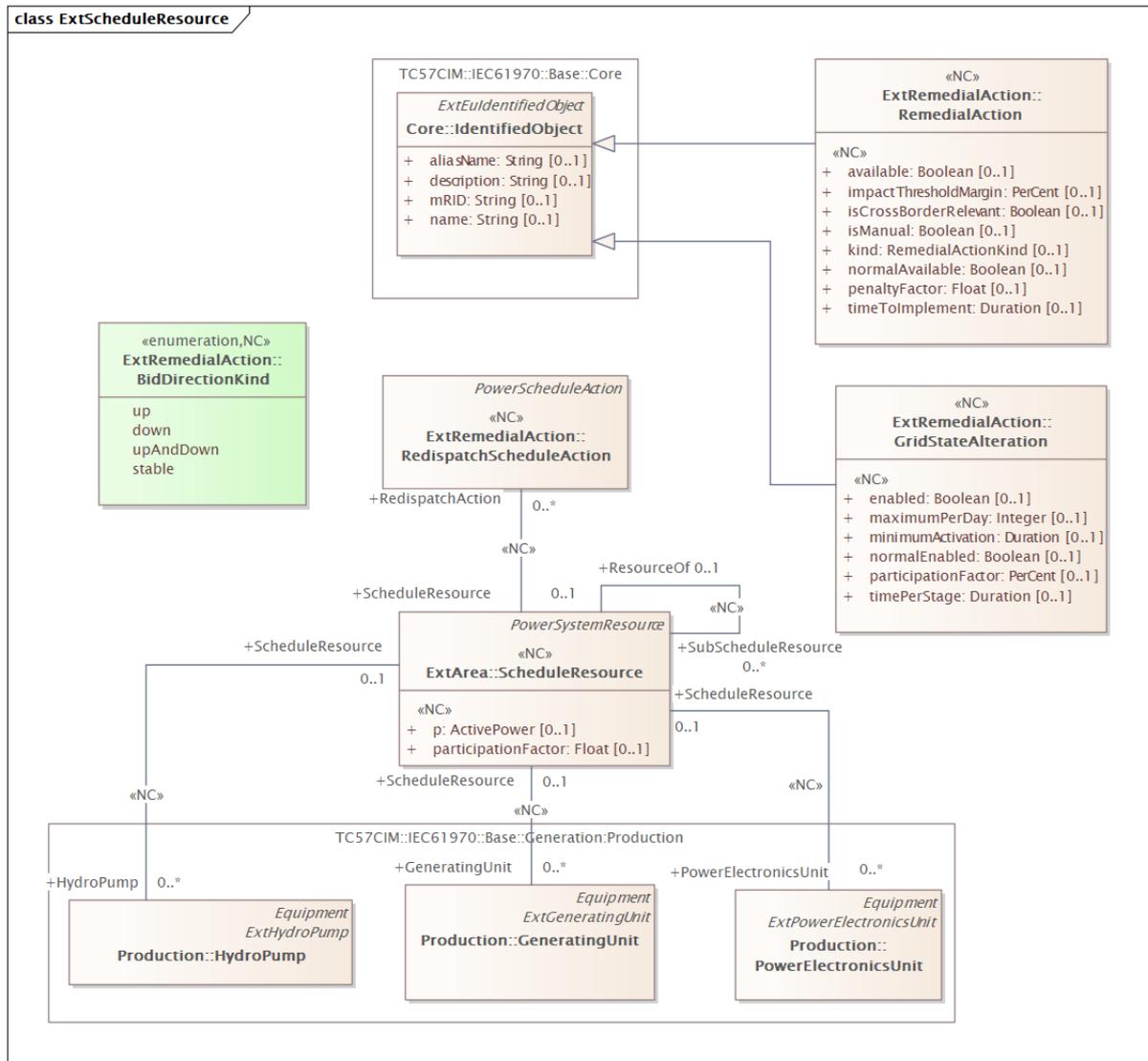
3731

#### 3.10.1 General

3732

This package contains the extensions related to the generation and load shift keys (GLSKs).





3736

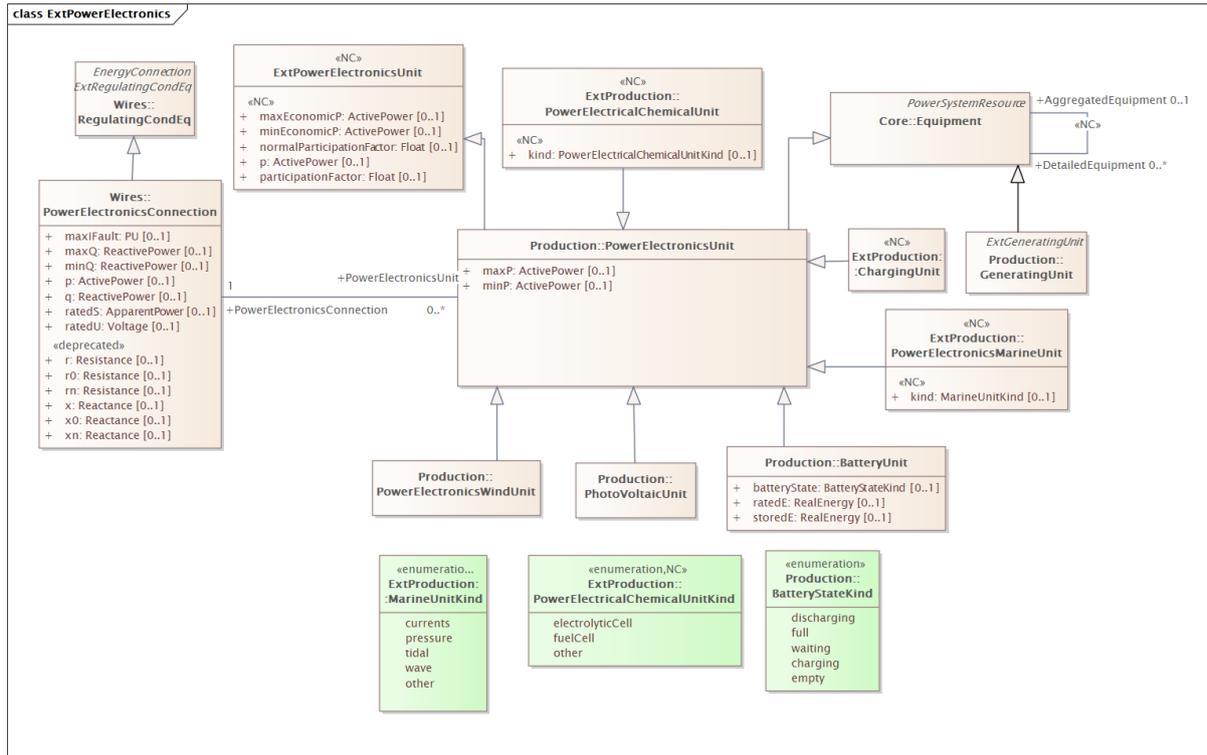
3737

**Figure 33 – Class diagram ExtPowerShiftKey::ExtScheduleResource**

3738

Figure 33: The diagram contains classes related to schedule resource.





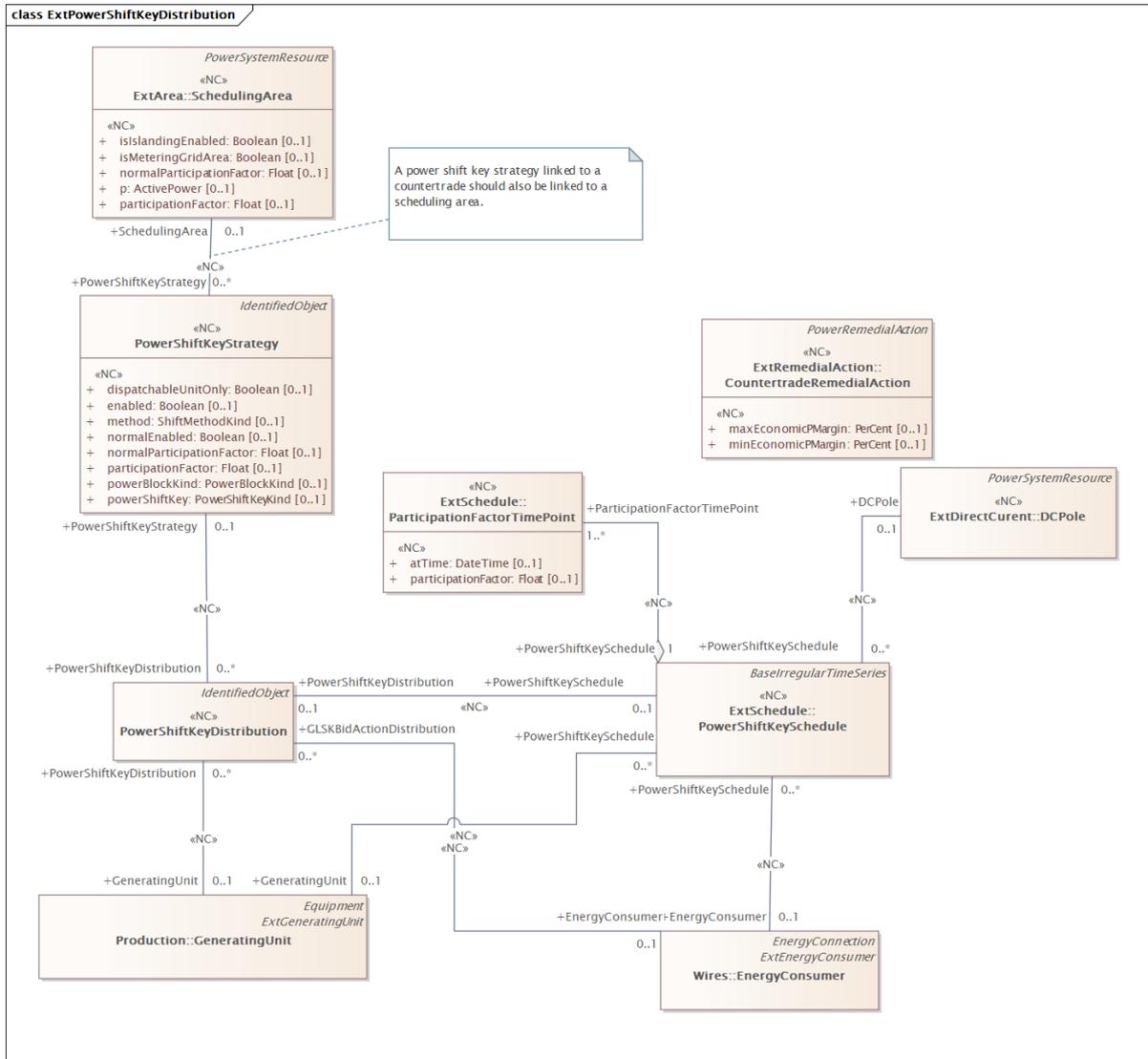
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3746

**Figure 36 – Class diagram ExtPowerShiftKey::ExtPowerElectronics**

3747

Figure 36: The diagram contains classes related to power electronics.



3748

3749

**Figure 37 – Class diagram ExtPowerShiftKey::ExtPowerShiftKeyDistribution**

3750 Figure 37:

3751 **3.10.2 (NC) AreaDispatchableUnit**

3752 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

3753 Allocates a given producing or consuming unit, including direct current corridor and collection of units, to a given control area (through the scheduling area) for supporting the control of the given area through dispatch instruction.

3756 Table 359 shows all attributes of AreaDispatchableUnit.

3757

**Table 359 – Attributes of ExtPowerShiftKey::AreaDispatchableUnit**

name	mult	type	description
enabled	0..1	Boolean	(NC) Identifies if the unit is enabled to accept a dispatch instruction. If true, the unit is enabled to accept a dispatch instruction. If false, the unit has the capability, but it is not enabled to receive a dispatch instruction.
normalEnabled	0..1	Boolean	(NC) Identifies if the unit is normally enabled to accept a dispatch instruction. If true, the unit is

name	mult	type	description
			enabled to accept a dispatch instruction. If false, the unit has the capability, but it is not enabled to receive a dispatch instruction.
p	0..1	ActivePower	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3758  
3759  
3760  
3761

Table 360 shows all association ends of AreaDispatchableUnit with other classes.

**Table 360 – Association ends of ExtPowerShiftKey::AreaDispatchableUnit with other classes**

mult from	name	mult to	type	description
0..1	EnergyConsumer	0..1	EnergyConsumer	Energy consumer for this area dispatchable unit.
0..1	GeneratingUnit	0..1	GeneratingUnit	(NC) The generating unit that belongs to area dispatchable unit.
0..1	HydroPump	0..1	HydroPump	(NC) Hydro Pump which is associated with the area dispatchable unit.
0..1	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) The power electronics unit that belongs to this area dispatchable unit.
0..*	SchedulingArea	1..1	<a href="#">SchedulingArea</a>	(NC) The scheduling area that has this area dispatchable unit.
0..1	PowerSchedule	0..*	<a href="#">PowerSchedule</a>	(NC) Power schedule which has area dispatchable units.
0..1	ScheduleResource	0..1	<a href="#">ScheduleResource</a>	(NC) The resource which is mFRR for the EnergySchedulingArea to which the AreaDispatchableUnit is connected. Note that this can be different than the area for the energy schedule.
0..*	TieCorridor	0..1	<a href="#">TieCorridor</a>	(NC) Tie Corridor which belongs to the Area Dispatchable Unit.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3762

3763 **3.10.3 (NC) EnergyBlockComponent**3764 Inheritance path = [EnergyComponent](#) : IdentifiedObject : ExtEulIdentifiedObject

3765 Energy block component where the energy group is distributed according to the energy block order of each energy component in an energy group.

3767 Table 361 shows all attributes of EnergyBlockComponent.

3768 **Table 361 – Attributes of ExtPowerShiftKey::EnergyBlockComponent**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3769

3770 Table 362 shows all association ends of EnergyBlockComponent with other classes.

3771 **Table 362 – Association ends of ExtPowerShiftKey::EnergyBlockComponent with other classes**

3772

mult from	name	mult to	type	description
1..1	EnergyBlockOrder	1..*	<a href="#">EnergyBlockOrder</a>	(NC) The energy block order for this energy block component.
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) inherited from: <a href="#">EnergyComponent</a>
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) inherited from: <a href="#">EnergyComponent</a>
0..*	HydroPump	0..1	HydroPump	(NC) inherited from: <a href="#">EnergyComponent</a>
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) inherited from: <a href="#">EnergyComponent</a>
0..*	EnergyGroup	0..1	<a href="#">EnergyGroup</a>	(NC) inherited from: <a href="#">EnergyComponent</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3773

3774 **3.10.4 (NC) EnergyBlockOrder**

3775 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3776 The energy block order is a block (an amount) of energy that forms the sequence of orders that are going to be distributed to an energy block component.

3778 Table 363 shows all attributes of EnergyBlockOrder.

3779 **Table 363 – Attributes of ExtPowerShiftKey::EnergyBlockOrder**

name	mult	type	description
participationFactor	0..1	Float	(NC) Participation factor.
sequence	0..1	Integer	(NC) Sequence needs to be ordered by the scheduling area. It has to be unique by the scheduling area.
normalParticipationFactor	0..1	Float	(NC) Normal participation factor.

name	mult	type	description
p	0..1	ActivePower	(NC) The maximum active power that can be applied as part of this block order.
normalSequence	0..1	Integer	(NC) Normal sequence represents the local order of the power block order. The sequence order for a given block dispatch instruction. The sequence number need to be unique for a given block dispatch instruction, e.g. two order in the same instruction cannot have the same sequence.
powerDuration	0..1	Duration	(NC) Duration for the active power.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3780

3781

Table 364 shows all association ends of EnergyBlockOrder with other classes.

3782

**Table 364 – Association ends of ExtPowerShiftKey::EnergyBlockOrder with other classes**

3783

mult from	name	mult to	type	description
1..*	EnergyBlockComponent	1..1	<a href="#">EnergyBlockComponent</a>	(NC) The energy block component that has this energy block order.
0..1	PowerShiftKeySchedule	0..*	<a href="#">PowerShiftKeySchedule</a>	(NC) The Power Shift Key schedule for an energy block order.
0..1	GenericSequenceSchedule	0..*	<a href="#">GenericSequenceSchedule</a>	(NC) Generic sequence schedule associated with an energy block order.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3784

3785

### 3.10.5 (NC) EnergyComponent

3786

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3787

The energy component for a producer or a consumer that has the same energy characteristic, e.g. fuel type and technology.

3788

3789

Table 365 shows all attributes of EnergyComponent.

3790

**Table 365 – Attributes of ExtPowerShiftKey::EnergyComponent**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3791

3792 Table 366 shows all association ends of EnergyComponent with other classes.

3793 **Table 366 – Association ends of ExtPowerShiftKey::EnergyComponent with other**  
3794 **classes**

mult from	name	mult to	type	description
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) The energy consumer that relates to this energy component.
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) The generating unit that is part of this energy component.
0..*	HydroPump	0..1	HydroPump	(NC) The hydro pump that relates to this energy component.
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) The power electronics unit that relates to this energy component.
0..*	EnergyGroup	0..1	<a href="#">EnergyGroup</a>	(NC) The energy group that has this energy component.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3795

3796 **3.10.6 (NC) EnergyGroup**

3797 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

3798 An energy group is an aggregation of energy components which have the same energy  
3799 characteristic, e.g. fuel type and technology. It can be used to allocate energy.

3800 Table 367 shows all attributes of EnergyGroup.

3801 **Table 367 – Attributes of ExtPowerShiftKey::EnergyGroup**

name	mult	type	description
normalParticipationFactor	0..1	Float	(NC) Normal participation factor for the power group in relation to scheduling area. Must be a positive value.
powerDuration	0..1	Duration	(NC) Duration for the active power.
p	0..1	ActivePower	(NC) Active power for the energy group representing a particular energy type. e.g. Wind Power
participationFactor	0..1	Float	(NC) Participation factor for the power group in relation to scheduling area. Must be a positive value.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3802

3803

Table 368 shows all association ends of EnergyGroup with other classes.

3804

**Table 368 – Association ends of ExtPowerShiftKey::EnergyGroup with other classes**

mult from	name	mult to	type	description
0..*	SchedulingArea	0..1	<a href="#">SchedulingArea</a>	(NC) The scheduling area that has this energy group.
0..*	EnergyType	0..1	<a href="#">EnergyType</a>	(NC) The energy type that the energy group are defined by.
0..1	PowerSchedule	0..*	<a href="#">PowerSchedule</a>	(NC) Power schedule which is associated with an energy group.
0..1	EnergyComponent	0..*	<a href="#">EnergyComponent</a>	(NC) The energy component that is part of this power group.
0..1	PowerShiftKeySchedule	0..*	<a href="#">PowerShiftKeySchedule</a>	(NC) The Power Shift Key schedule for an energy group.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3805

**3.10.7 (NC) EnergyType**

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

A source of the energy.

An energy type reference refers to an energy characteristic that is needed for reporting, e.g.

European Energy Certificate System (EECS). The kind of energy should be possible to be linked with different type of energy forecast, e.g. wind production for a given area based on wind forecast.

Table 369 shows all attributes of EnergyType.

3814

**Table 369 – Attributes of ExtPowerShiftKey::EnergyType**

name	mult	type	description
kind	0..1	<a href="#">EnergyKind</a>	(NC) The kind of energy type.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3815

3816

Table 370 shows all association ends of EnergyType with other classes.

3817 **Table 370 – Association ends of ExtPowerShiftKey::EnergyType with other classes**

mult from	name	mult to	type	description
0..1	ScheduleResource	0..*	<a href="#">ScheduleResource</a>	(NC) Schedule resource unit that has an energy reference type.
0..*	EnergySourceReference	0..1	<a href="#">EnergySourceReference</a>	(NC) Energy source reference which has energy type references.
0..1	EnergyGroup	0..*	<a href="#">EnergyGroup</a>	(NC) The energy group that has this energy type.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3818

3819 **3.10.8 (NC) ExtEnergyConsumer root class**

3820 EU Network Code extension of EnergyConsumer.

3821 Table 371 shows all attributes of ExtEnergyConsumer.

3822

**Table 371 – Attributes of ExtPowerShiftKey::ExtEnergyConsumer**

name	mult	type	description
normalParticipationFactor or	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.  In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ .  In the case of priority strategy, the item with the lowest number gets allocated energy first.
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.  In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ .  In the case of priority strategy, the item with the lowest number gets allocated energy first.
maxEconomicP	0..1	ActivePower	(NC) Maximum high economic active power limit, that should not exceed the maximum operating active power limit.
minEconomicP	0..1	ActivePower	(NC) Low economic active power limit that shall be greater than or equal to the minimum operating active power limit.

3823

3824 **3.10.9 (NC) ExtGeneratingUnit root class**

3825 EU Network Code extension of GeneratingUnit.

3826 Table 372 shows all attributes of ExtGeneratingUnit.

3827

**Table 372 – Attributes of ExtPowerShiftKey::ExtGeneratingUnit**

name	mult	type	description
maxStartupLoad	0..1	ActivePower	(NC) Maximum consumption by the generating unit as part of the startup process.
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.  In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ .  In the case of priority strategy, the item with the lowest number gets allocated energy first.
shutdownCost	0..1	Money	(NC) The shutdown cost incurred for each shutdown of the GeneratingUnit.
shutdownTime	0..1	Duration	(NC) Time it takes to shutdown the unit.
normalMustRunP	0..1	ActivePower	(NC) Normal minimum active power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
mustRunP	0..1	ActivePower	(NC) Minimum active power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
runningLeadTime	0..1	Duration	(NC) Time it takes to change the schedule when the unit is operating due to technical configuration of a supporting system, e.g. gas pipeline.
warmStartupTime	0..1	Duration	(NC) Time it takes to startup the unit when it is warm.
coolDownTime	0..1	Duration	(NC) Time it takes from a unit shutdown until it is considered cold.
warmStartupCost	0..1	Money	(NC) The warm startup cost incurred for each start of the GeneratingUnit.
startupRampRate	0..1	ActivePowerChangeRate	(NC) The startup ramp rate of the generating unit which describes the speed of change of active power from zero to the minimum active power.  When the ramp is not provided, the optimisation process shall consider the change as an instant change of active power from zero to minimum active power.
minimumUpTime	0..1	Duration	(NC) The time that a generating unit has to stay running after it has been switched on by the Remedial Action Optimizer.
normalStartupCost	0..1	Money	(NC) The normal initial startup cost incurred for each start of the GeneratingUnit.
normalWarmStartupCost	0..1	Money	(NC) The normal warm startup cost incurred for each start of the GeneratingUnit.
mustRunQ	0..1	ReactivePower	(NC) Minimum reactive power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum

name	mult	type	description
			operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
normalMustRunQ	0..1	ReactivePower	(NC) Normal minimum reactive power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
mustRun	0..1	Boolean	(NC) Identifies if the generating unit is a must-run unit. This means that it cannot be instructed to shutdown due to other obligation. e.g. Providing heat. If true, the generating unit is must-run. If false, it is not.

3828

3829 **3.10.10 (NC) ExtHydroPump root class**

3830 EU Network Code extension of HydroPump.

3831 Table 373 shows all attributes of ExtHydroPump.

3832

**Table 373 – Attributes of ExtPowerShiftKey::ExtHydroPump**

name	mult	type	description
normalParticipationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.  In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ .  In the case of priority strategy, the item with the lowest number gets allocated energy first.
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.  In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ .  In the case of priority strategy, the item with the lowest number gets allocated energy first.
maxEconomicP	0..1	ActivePower	(NC) Maximum high economic active power limit, that should not exceed the maximum operating active power limit.
maxOperatingP	0..1	ActivePower	(NC) This is the maximum operating active power limit the dispatcher can enter for this unit.
minEconomicP	0..1	ActivePower	(NC) Low economic active power limit that shall be greater than or equal to the minimum operating active power limit.
minOperatingP	0..1	ActivePower	(NC) This is the minimum operating active power limit the dispatcher can enter for this unit.

3833

3834 **3.10.11 (NC) ExtPowerElectronicsUnit root class**

3835 EU Network Code extension of PowerElectronicsUnit.

3836 Table 374 shows all attributes of ExtPowerElectronicsUnit.

3837

**Table 374 – Attributes of ExtPowerShiftKey::ExtPowerElectronicsUnit**

name	mult	type	description
p	0..1	NullCIM	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.
normalParticipationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$ . In the case of priority strategy, the item with the lowest number gets allocated energy first.
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(\text{PF})$ . In the case of priority strategy, the item with the lowest number gets allocated energy first.
maxEconomicP	0..1	ActivePower	(NC) Maximum high economic active power limit, that should not exceed the maximum operating active power limit.
minEconomicP	0..1	ActivePower	(NC) Low economic active power limit that shall be greater than or equal to the minimum operating active power limit.

3838

**3.10.12 (NC) ProportionalEnergyComponent**3840 Inheritance path = [EnergyComponent](#) : IdentifiedObject : ExtEulIdentifiedObject

3841 Serves for grouping components within an energy group, with proportional energy allocation to all components.

3843 Table 375 shows all attributes of ProportionalEnergyComponent.

**Table 375 – Attributes of ExtPowerShiftKey::ProportionalEnergyComponent**

name	mult	type	description
normalParticipationFactor	0..1	Float	(NC) Normal participation factor.
powerDuration	0..1	Duration	(NC) Duration for the active power.
p	0..1	ActivePower	(NC) The maximum active power that can be applied as part of this block order.
participationFactor	0..1	Float	(NC) Participation factor.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3845

3846 Table 376 shows all association ends of ProportionalEnergyComponent with other classes.

3847 **Table 376 – Association ends of ExtPowerShiftKey::ProportionalEnergyComponent with**  
3848 **other classes**

mult from	name	mult to	type	description
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) inherited from: <a href="#">EnergyComponent</a>
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) inherited from: <a href="#">EnergyComponent</a>
0..*	HydroPump	0..1	HydroPump	(NC) inherited from: <a href="#">EnergyComponent</a>
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) inherited from: <a href="#">EnergyComponent</a>
0..*	EnergyGroup	0..1	<a href="#">EnergyGroup</a>	(NC) inherited from: <a href="#">EnergyComponent</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3849

3850 **3.10.13 (NC) EnergyKind enumeration**

3851 Categories of energy used for energy groups.

3852 Table 377 shows all literals of EnergyKind.

3853 **Table 377 – Literals of ExtPowerShiftKey::EnergyKind**

literal	value	description
hydroRunOfRiver		Hydro run of river.
hydroWaterReservoir		Hydro water reservoir.
hydroPump		Hydro pump.
biomass		Biomass.
fossil		Fossil.
geothermal		Geothermal.
marine		Marine.
nuclear		Nuclear.
uncontrollableConsumption		Consumption where there is no flexibility and it is measurable and under possibility to provide a forecast. e.g. TV, indoor lightning.
timeShiftConsumption		Operation can be shifted in time but can have a deadline e.g. washing machine, dishwasher.
battery		Battery storage.
bufferConsumption		Flexibility in operation but bound to some buffering capability e.g. battery, electrical vehicle, cooling system, freezer.
solar		Solar.
unconstrainedConsumption		Consumption is not constrained by any buffer and provides full flexibility. It is difficult to

literal	value	description
		measure and to provide forecast. The consumption can be provided by local production. e.g. gas generator, diesel generator wood fire, etc.
waste		Waste.
wind		Wind.
other		Other.

3854

3855 **3.10.14 (NC) PowerShiftKeyKind enumeration**

3856 Kind of generating and load shift keys strategy.

3857 Table 378 shows all literals of PowerShiftKeyKind.

3858

**Table 378 – Literals of ExtPowerShiftKey::PowerShiftKeyKind**

literal	value	description
explicitInstruction		The distribution is done according to the individual participation factor on the unit.
explicitDistribution		The distribution is explicitly done according to the power shift key distribution in the power bid Schedule.
generatorsFlat		Flat adjustment, equal amount of power, on all active generators. e.g. 100 MW increase adjustment on 4 generators, it means that each of them get increased 25 MW, as long as no other constraints are violated.
consumptionsFlat		Flat adjustment, equal amount of power, on all active consumption units (Energy Consumers and Power Electronics like FlexibleEnergyUnit). e.g. 100 MW decrease adjustment on 4 loads, it means that each of them get reduced 25 MW, as long as no other constraints are violated.
generatorsPmax		The distribution is relative to the maximum p of the generator.
generatorsP		The distribution is based on the generators active power in the given case.
consumptionsP		The distribution is based on the consumptions active power in the given case.
generatorsAndConsumptionsP		The distribution is based on the generator and consumption active power in the given case.
generatorsRemainingCapacity		The distribution is based on the remaining capacity for generators in the given case.
nonConformLoadP		The distribution is based on the non conform load active power in the given case.
storageP		The distribution is based on the batteries and any operating hydro pumps active power in the given case.
storageFlat		Flat adjustment, equal amount of power, on all the batteries and any operating hydro pumps. e.g. 100 MW increase or decrease adjustment on 4 batteries, it means that each of them get increased or reduced 25 MW, as long as no other constraints are violated.
generatorsPmin		The distribution is relative to the minimum p of the generator.

literal	value	description
generatorsUsedCapacity		The distribution is based on the used capacity, the difference between the minimum operation and operating p (GeneratingUnit.minOperatingP)

3859

3860 **3.10.15 (NC) PowerShiftKeyDistribution**

3861 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3862 Distribution of the bid action on the power shift keys.

3863 Table 379 shows all attributes of PowerShiftKeyDistribution.

3864

**Table 379 – Attributes of ExtPowerShiftKey::PowerShiftKeyDistribution**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3865

3866 Table 380 shows all association ends of PowerShiftKeyDistribution with other classes.

**Table 380 – Association ends of ExtPowerShiftKey::PowerShiftKeyDistribution with other classes**

mult from	name	mult to	type	description
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) Energy consumers distribution for a given bid.
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) Generating unit distribution for a given bid.
0..*	HydroPump	0..1	HydroPump	(NC) Hydro pump distribution for a given bid.
0..1	PowerElectronicsUnit	0..*	PowerElectronicsUnit	(NC) Power electronics unit distribution for a given bid.
0..*	PowerBidSchedule	0..1	<a href="#">PowerBidSchedule</a>	(NC) Power bid schedule for the given distribution.
0..1	PowerShiftKeySchedule	0..1	<a href="#">PowerShiftKeySchedule</a>	(NC) Power Shift Key schedule in power shift key distribution.
0..*	PowerShiftKeyStrategy	0..1	<a href="#">PowerShiftKeyStrategy</a>	(NC) Power Shift Key Strategy which has a Power Shift Key Distribution.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3869

3870 **3.10.16 (NC) PowerShiftKeyStrategy**

3871 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3872 Strategy of the power shift key.

3873 Table 381 shows all attributes of PowerShiftKeyStrategy.

3874

**Table 381 – Attributes of ExtPowerShiftKey::PowerShiftKeyStrategy**

name	mult	type	description
powerShiftKey	0..1	<a href="#">PowerShiftKeyKind</a>	(NC) Power shift keys strategy gives instruction on how the value (Active power) is going to be distributed inside the relevant bidding zone.
method	0..1	<a href="#">ShiftMethodKind</a>	(NC) Shift method used for the power shift strategy.
participationFactor	0..1	Float	(NC) Participation factor describing the entities part of the power shift strategy. Must be a positive value.
enabled	0..1	Boolean	(NC) If true, the assessed element is enabled, otherwise it is disabled.
normalEnabled	0..1	Boolean	(NC) If true, the assessed element shall be considered under normal operating conditions.
normalParticipationFactor	0..1	Float	(NC) Normal participation factor describing the entities part of the power shift strategy. Must be a positive value.
powerBlockKind	0..1	<a href="#">PowerBlockKind</a>	(NC) Power block kind creates block (one or more) of power shift key strategy to address increase and/or decrease of power for a given scheduling area.
dispatchableUnitOnly	0..1	Boolean	(NC) If true, only dispatchable units are included in the power shift key strategy. A unit is considered dispatchable if it is associated with an area dispatchable unit that is linked to the same scheduling area as the power shift key strategy. Exceptions are done for units that are included in explicit or distributed strategies.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

3875

3876

Table 382 shows all association ends of PowerShiftKeyStrategy with other classes.

3877

3878

**Table 382 – Association ends of ExtPowerShiftKey::PowerShiftKeyStrategy with other classes**

mult from	name	mult to	type	description
0..*	SchedulingArea	0..1	<a href="#">SchedulingArea</a>	(NC) Scheduling area associated with power shift key strategy.
0..1	PowerShiftKeyDistribution	0..*	<a href="#">PowerShiftKeyDistribution</a>	(NC) Power Shift Key Distribution associated to this power shift key strategy.
0..*	PowerRemedialAction	0..1	<a href="#">PowerRemedialAction</a>	(NC) Power remedial action which has power shift key strategy.
0..1	PowerFrequencyController	0..*	<a href="#">PowerFrequencyController</a>	(NC) Power frequency controller that has power shift key strategy.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3879

3880 **3.10.17 (NC) PowerBlockKind enumeration**

3881 Power block kind describes the increase and/or decrease of power.

3882 Table 383 shows all literals of PowerBlockKind.

3883 **Table 383 – Literals of ExtPowerShiftKey::PowerBlockKind**

literal	value	description
powerIncrease		Increase in the power. The block represents action for increased power.
powerDecrease		Decrease in the power. The block represents action for decreased power.
powerIncreaseAndDecrease		Increase and decrease in the power. The block represents action for increased and decreased power.

3884

3885 **3.10.18 (NC) EnergySourceReference**

3886 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

3887 An energy source reference refers to a set of fuel types characteristic for reporting, e.g.

3888 European Energy Certificate System (EECS). The kind of energy should be possible to be linked

3889 with different type of energy forecast, e.g. wind production for a given area based on wind

3890 forecast.

3891 Table 384 shows all attributes of EnergySourceReference.

3892 **Table 384 – Attributes of ExtPowerShiftKey::EnergySourceReference**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3893

3894 Table 385 shows all association ends of EnergySourceReference with other classes.

3895 **Table 385 – Association ends of ExtPowerShiftKey::EnergySourceReference with other classes**

3896

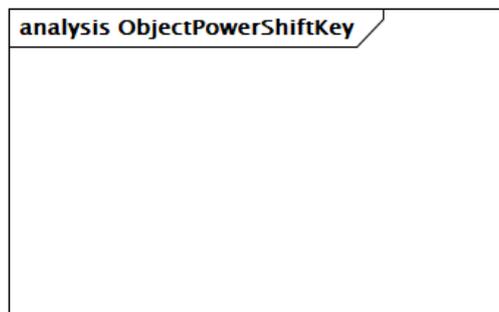
mult from	name	mult to	type	description
0..1	EnergyTypeReference	0..*	<a href="#">EnergyType</a>	(NC) Energy type reference which belong to an energy source reference.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3897

3898 **3.10.19 Package ObjectPowerShiftKey**

3899



3900

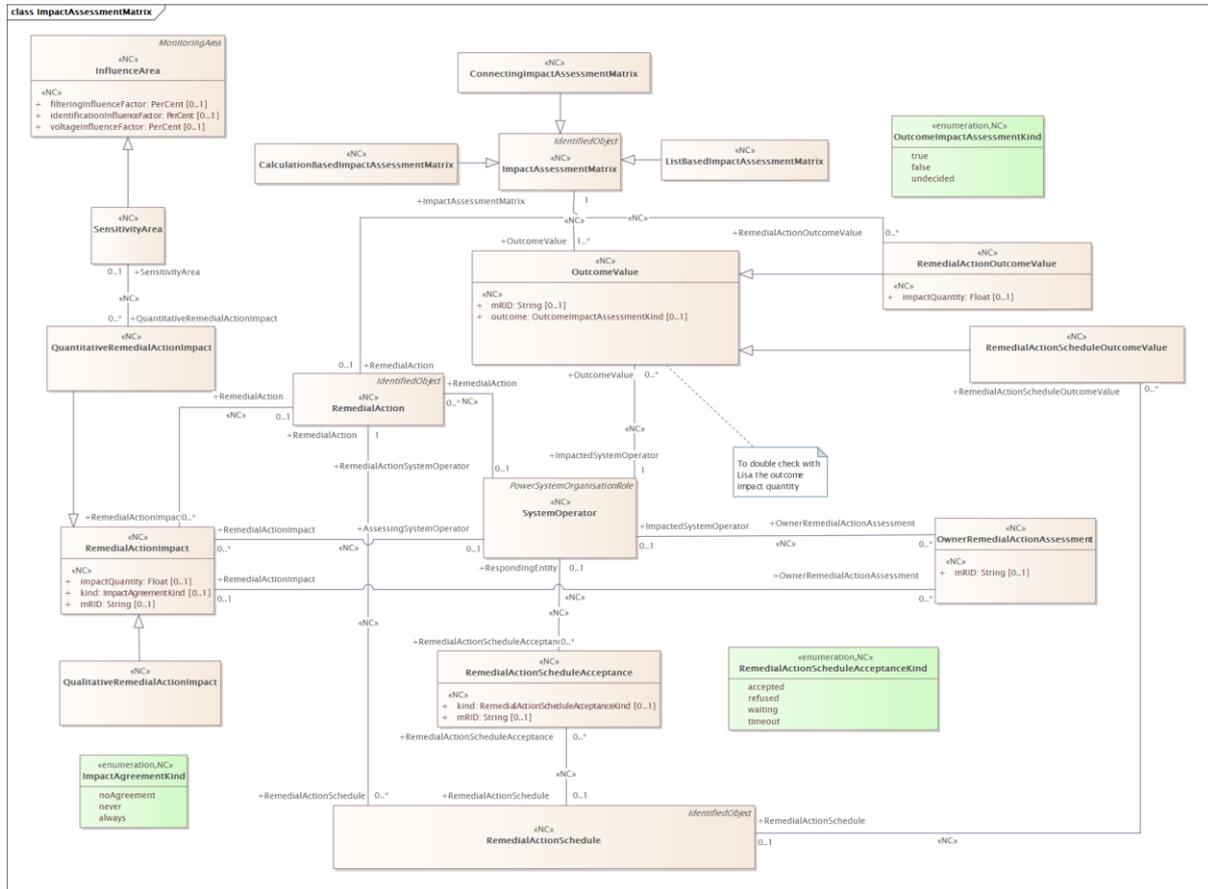
3901 **Figure 38 – Analysis diagram ObjectPowerShiftKey::ObjectPowerShiftKey**

3902 Figure 38:

3903 **3.11 Impact assessment matrix extensions**

3904 **3.11.1 General**

3905 This package contains the extensions related to the impact assessment matrix.



3906

3907 **Figure 39 – Class diagram ExtImpactAssessmentMatrix::ImpactAssessmentMatrix**

3908 Figure 39: The diagram contains the classes related to the modelling of the impact assessment  
3909 matrix.

3910 **3.11.2 (NC) CalculationBasedImpactAssessmentMatrix**

3911 Inheritance path = [ImpactAssessmentMatrix](#) : IdentifiedObject : ExtEulIdentifiedObject  
3912 Calculation based impact assessment matrix. It relates to the remedial action schedule.  
3913 Calculation-Based is the impact matrix determined by calculating the impact factors (eventually  
3914 scaled by the intensity of the remedial action) and matching them against a threshold in a  
3915 determined way described by the methodologies.  
3916 Table 386 shows all attributes of CalculationBasedImpactAssessmentMatrix.

3917 **Table 386 – Attributes of**  
3918 **ExtImpactAssessmentMatrix::CalculationBasedImpactAssessmentMatrix**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3919

3920 Table 387 shows all association ends of CalculationBasedImpactAssessmentMatrix with other  
3921 classes.

3922  
3923  
3924**Table 387 – Association ends of  
ExtImpactAssessmentMatrix::CalculationBasedImpactAssessmentMatrix with other  
classes**

mult from	name	mult to	type	description
1..1	OutcomeValue	1..*	<a href="#">OutcomeValue</a>	(NC) inherited from: <a href="#">ImpactAssessmentMatrix</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3925

**3.11.3 (NC) ConnectingImpactAssessmentMatrix**3927 Inheritance path = [ImpactAssessmentMatrix](#) : IdentifiedObject : ExtEulIdentifiedObject3928 Connecting system operator matrix is the impact matrix indicating which system operators are  
3929 connecting for that specific remedial action. The concept of connecting system operator for a  
3930 remedial action is defined by CSAm Article 2.1(14).

3931 Table 388 shows all attributes of ConnectingImpactAssessmentMatrix.

3932  
3933**Table 388 – Attributes of  
ExtImpactAssessmentMatrix::ConnectingImpactAssessmentMatrix**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3934

3935 Table 389 shows all association ends of ConnectingImpactAssessmentMatrix with other  
3936 classes.3937  
3938**Table 389 – Association ends of  
ExtImpactAssessmentMatrix::ConnectingImpactAssessmentMatrix with other classes**

mult from	name	mult to	type	description
1..1	OutcomeValue	1..*	<a href="#">OutcomeValue</a>	(NC) inherited from: <a href="#">ImpactAssessmentMatrix</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3939

**3.11.4 (NC) ImpactAssessmentMatrix**3940 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject  
3941

3942 The result of an impact assessment analysis for each remedial action or remedial action  
3943 schedule onto the grid and operation of each system operator.  
3944 Table 390 shows all attributes of ImpactAssessmentMatrix.

3945 **Table 390 – Attributes of ExtImpactAssessmentMatrix::ImpactAssessmentMatrix**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3946  
3947 Table 391 shows all association ends of ImpactAssessmentMatrix with other classes.

3948 **Table 391 – Association ends of ExtImpactAssessmentMatrix::ImpactAssessmentMatrix**  
3949 **with other classes**

mult from	name	mult to	type	description
1..1	OutcomeValue	1..*	<a href="#">OutcomeValue</a>	(NC) One of the values of the impact assessment matrix.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3950  
3951 **3.11.5 (NC) ListBasedImpactAssessmentMatrix**  
3952 Inheritance path = [ImpactAssessmentMatrix](#) : IdentifiedObject : ExtEulIdentifiedObject  
3953 List-Based is the impact matrix determined by agreement of the system operators involved.  
3954 System operators jointly decide which Remedial Action (eventually scaled by the intensity of  
3955 the remedial action) is impacting.  
3956 Table 392 shows all attributes of ListBasedImpactAssessmentMatrix.

3957 **Table 392 – Attributes of**  
3958 **ExtImpactAssessmentMatrix::ListBasedImpactAssessmentMatrix**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

3959  
3960 Table 393 shows all association ends of ListBasedImpactAssessmentMatrix with other classes.

3961  
3962**Table 393 – Association ends of ExtImpactAssessmentMatrix::ListBasedImpactAssessmentMatrix with other classes**

mult from	name	mult to	type	description
1..1	OutcomeValue	1..*	<a href="#">OutcomeValue</a>	(NC) inherited from: <a href="#">ImpactAssessmentMatrix</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

3963

**3.11.6 (NC) OutcomeValue root class**

3965 Outcome of an impact assessment matrix.

3966 Table 394 shows all attributes of OutcomeValue.

3967

**Table 394 – Attributes of ExtImpactAssessmentMatrix::OutcomeValue**

name	mult	type	description
outcome	0..1	<a href="#">OutcomeImpactAssessmentKind</a>	(NC) Outcome value.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

3968

3969 Table 395 shows all association ends of OutcomeValue with other classes.

**Table 395 – Association ends of ExtImpactAssessmentMatrix::OutcomeValue with other classes**

mult from	name	mult to	type	description
1..*	ImpactAssessmentMatrix	1..1	<a href="#">ImpactAssessmentMatrix</a>	(NC) the impact assessment matrix which has this value.
0..*	ImpactedSystemOperator	1..1	<a href="#">SystemOperator</a>	(NC) The impacted system operator that has an outcome value.

3972

**3.11.7 (NC) OwnerRemedialActionAssessment root class**

3974 Owner remedial action assessment of the impact of their remedial action on neighboring system operators.

3976 Table 396 shows all attributes of OwnerRemedialActionAssessment.

3977  
3978**Table 396 – Attributes of  
ExtImpactAssessmentMatrix::OwnerRemedialActionAssessment**

name	mult	type	description
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

3979  
3980

Table 397 shows all association ends of OwnerRemedialActionAssessment with other classes.

3981  
3982**Table 397 – Association ends of  
ExtImpactAssessmentMatrix::OwnerRemedialActionAssessment with other classes**

mult from	name	mult to	type	description
0..*	RemedialActionImpact	0..1	<a href="#">RemedialActionImpact</a>	(NC) Remedial action impact which is evaluated by the owner of the remedial action.
0..*	ImpactedSystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) System operator that is evaluated to be impacted by the remedial action done by the remedial action owner.

3983

**3.11.8 (NC) RemedialActionOutcomeValue**3985 Inheritance path = [OutcomeValue](#)

3986 Outcome of an impact assessment matrix for a remedial action.

3987 Table 398 shows all attributes of RemedialActionOutcomeValue.

**Table 398 – Attributes of ExtImpactAssessmentMatrix::RemedialActionOutcomeValue**

name	mult	type	description
impactQuantity	0..1	Float	(NC) Delta, positive or negative, quantity that when it is applied to the remedial action, it will cause impact on a conducting equipment monitored by the assessed system operator.  Example of relevant remedial action changes are redispatching, countertrading, change of set point on HVDC systems or change of taps on phase-shifting transformers.
outcome	0..1	<a href="#">OutcomeImpactAssessmentKind</a>	(NC) inherited from: <a href="#">OutcomeValue</a>
mRID	0..1	String	(NC) inherited from: <a href="#">OutcomeValue</a>

3989

3990 Table 399 shows all association ends of RemedialActionOutcomeValue with other classes.

3991  
3992**Table 399 – Association ends of  
ExtImpactAssessmentMatrix::RemedialActionOutcomeValue with other classes**

mult from	name	mult to	type	description
0..*	RemedialAction	0..1	<a href="#">RemedialAction</a>	(NC) The remedial action that has a remedial action outcome value.

mult from	name	mult to	type	description
1..*	ImpactAssessmentMatrix	1..1	<a href="#">ImpactAssessmentMatrix</a>	(NC) inherited from: <a href="#">OutcomeValue</a>
0..*	ImpactedSystemOperator	1..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">OutcomeValue</a>

3993

3994 **3.11.9 (NC) RemedialActionScheduleOutcomeValue**3995 Inheritance path = [OutcomeValue](#)

3996 Outcome of an impact assessment matrix for a remedial action schedule.

3997 Table 400 shows all attributes of RemedialActionScheduleOutcomeValue.

3998

3999

**Table 400 – Attributes of  
ExtImpactAssessmentMatrix::RemedialActionScheduleOutcomeValue**

name	mult	type	description
outcome	0..1	<a href="#">OutcomeImpactAssessmentKind</a>	(NC) inherited from: <a href="#">OutcomeValue</a>
mRID	0..1	String	(NC) inherited from: <a href="#">OutcomeValue</a>

4000

4001 Table 401 shows all association ends of RemedialActionScheduleOutcomeValue with other  
4002 classes.

4003

4004

4005

**Table 401 – Association ends of  
ExtImpactAssessmentMatrix::RemedialActionScheduleOutcomeValue with other  
classes**

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	<a href="#">RemedialActionSchedule</a>	(NC) The remedial action schedule that has a remedial action schedule outcome value.
1..*	ImpactAssessmentMatrix	1..1	<a href="#">ImpactAssessmentMatrix</a>	(NC) inherited from: <a href="#">OutcomeValue</a>
0..*	ImpactedSystemOperator	1..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">OutcomeValue</a>

4006

4007 **3.11.10 (NC) OutcomelmpactAssessmentKind enumeration**

4008 Outcome impact assessments kinds.

4009 Table 402 shows all literals of OutcomelmpactAssessmentKind.

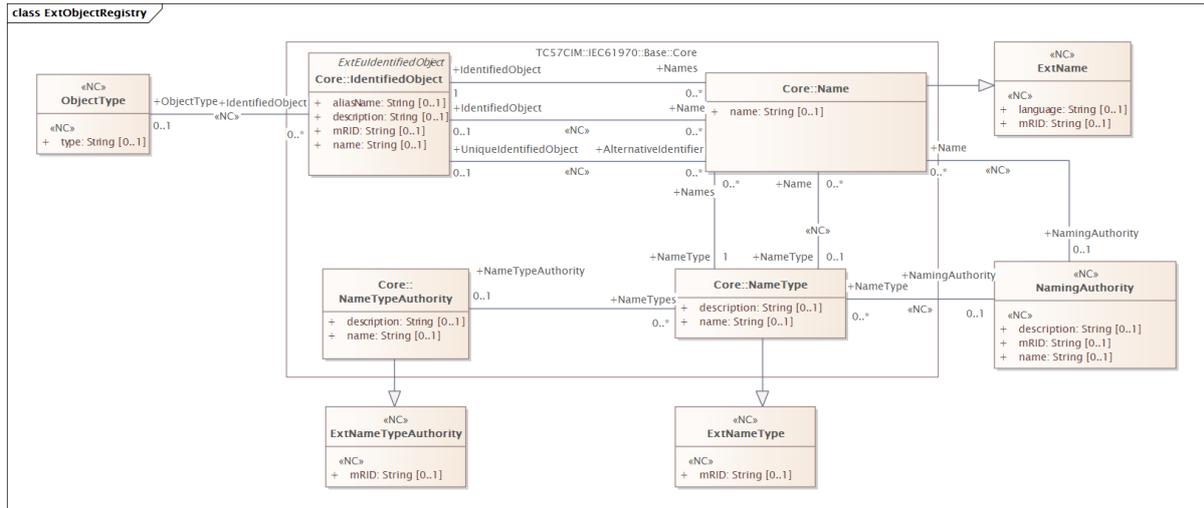
4010 **Table 402 – Literals of ExtImpactAssessmentMatrix::OutcomelmpactAssessmentKind**

literal	value	description
true		True.
false		False.
undecided		Undecided. Used only for list-based impact assessment matrix.

4011

4012 **3.12 Package ExtObjectRegistry**4013 **3.12.1 General**

4014 This package contains the extensions related to the object registry.



4015

**Figure 40 – Class diagram ExtObjectRegistry::ExtObjectRegistry**

4016

4017 Figure 40: The diagram contains classes related to the object registry extension.

4018 **3.12.2 (NC) ExtName root class**

4019 Extension of Name.

4020 Table 403 shows all attributes of ExtName.

4021

**Table 403 – Attributes of ExtObjectRegistry::ExtName**

name	mult	type	description
language	0..1	String	(NC) Shall be specified as an IETF BCP 47 language tag (e.g. en-US). Applies to the Name.name attribute.  IETF language tags combine subtags from other standards such as ISO 639, ISO 15924, ISO 3166-1, and UN M.49. The tag structure has been standardized by the IETF in Best Current Practice (BCP) 47; the subtags are maintained by the IANA Language Subtag Registry.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4022

4023 **3.12.3 (NC) ExtNameType root class**

4024 An extension of NameType.

4025 Table 404 shows all attributes of ExtNameType.

4026

**Table 404 – Attributes of ExtObjectRegistry::ExtNameType**

name	mult	type	description
mRID	0..1	String	(NC) 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

name	mult	type	description
			4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4027

4028 **3.12.4 (NC) ExtNameTypeAuthority root class**

4029 Extension of NameTypeAuthority.

4030 Table 405 shows all attributes of ExtNameTypeAuthority.

4031

**Table 405 – Attributes of ExtObjectRegistry::ExtNameTypeAuthority**

name	mult	type	description
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4032

4033 **3.12.5 (NC) NamingAuthority root class**

4034 Authority responsible for creation and management of names of a given name type and/or name; typically an organization or an enterprise system.

4035 Table 406 shows all attributes of NamingAuthority.

4036

**Table 406 – Attributes of ExtObjectRegistry::NamingAuthority**

name	mult	type	description
description	0..1	String	(NC) Description of the name authority.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
name	0..1	String	(NC) Name of the name authority.

4038

4039 Table 407 shows all association ends of NamingAuthority with other classes.

4040 **Table 407 – Association ends of ExtObjectRegistry::NamingAuthority with other classes**

mult from	name	mult to	type	description
0..1	Name	0..*	Name	(NC) All names managed by this authority.
0..1	NameType	0..*	NameType	(NC) All name types managed by this authority.

4041

4042 **3.12.6 (NC) ObjectType root class**

4043 Identifies the specialised type of an object when the instance object is serialised using a  
 4044 generalised class. It may be useful when the object type is not otherwise included in the  
 4045 exchange. For example, a Meter may be serialised as an EndDevice in message exchanges  
 4046 and need to have the ObjectType.type be specified as 'Meter' to provide context to the message  
 4047 receiver.

4048 Table 408 shows all attributes of ObjectType.

4049 **Table 408 – Attributes of ExtObjectRegistry::ObjectType**

name	mult	type	description
type	0..1	String	(NC) The specialised type of an object when the instance object is serialised using a generalised class. For example, a Meter being serialised as an EndDevice in a message exchange should have the type attribute specified as 'Meter'.

4050

4051 Table 409 shows all association ends of ObjectType with other classes.

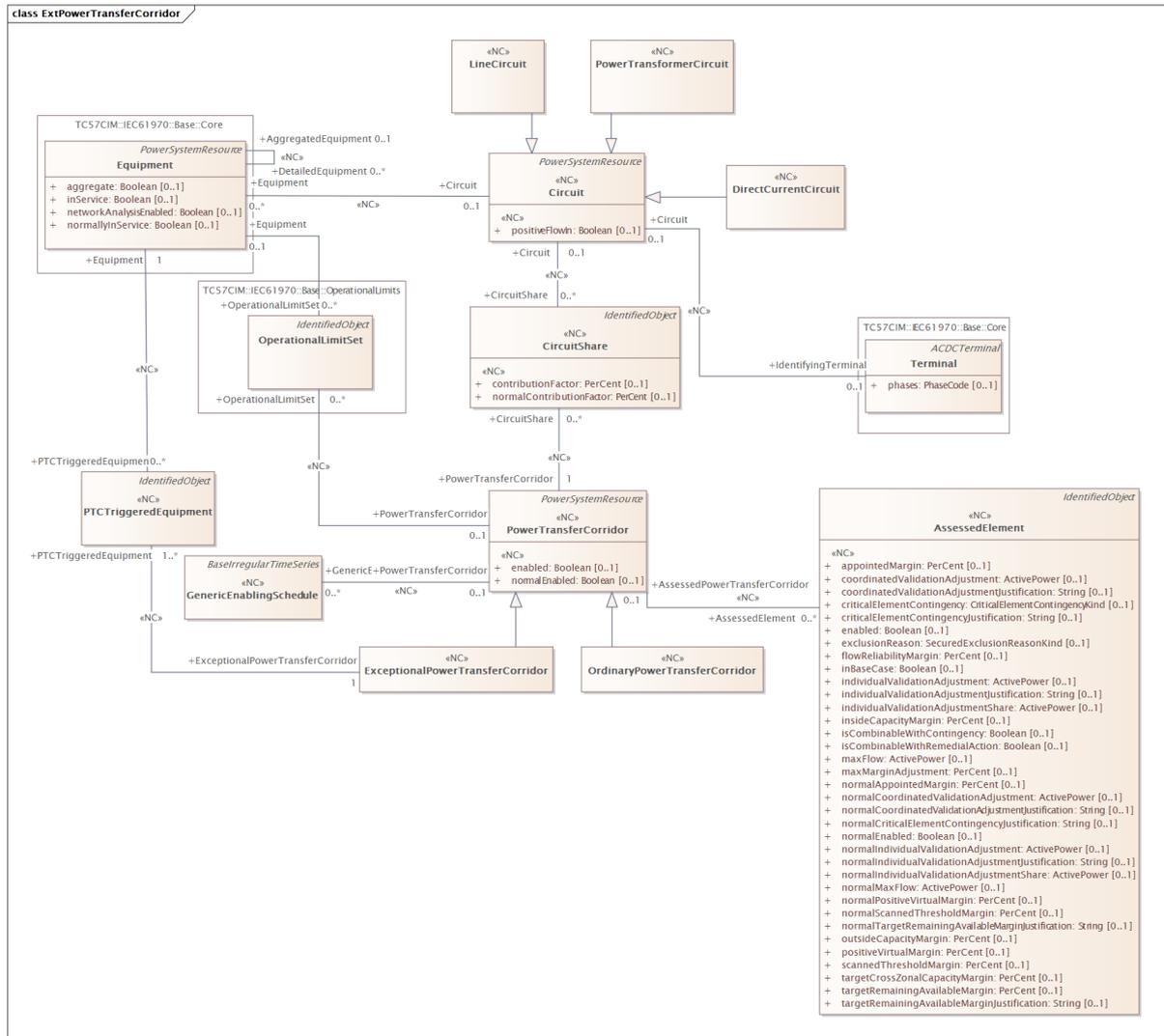
4052 **Table 409 – Association ends of ExtObjectRegistry::ObjectType with other classes**

mult from	name	mult to	type	description
0..1	IdentifiedObject	0..*	IdentifiedObject	(NC) The IdentifiedObject whose type is identified by ObjectType.

4053

4054 **3.13 Package ExtPowerTransferCorridor**4055 **3.13.1 General**

4056 This package contains the extensions related to the power transfer corridor.



4057  
4058 **Figure 41 – Class diagram ExtPowerTransferCorridor::ExtPowerTransferCorridor**

4059 Figure 41: The diagram contains classes related to power transfer corridor.

4060 **3.13.2 (NC) Circuit**

4061 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

4062 A circuit is a collection of equipment in a network graph that provide common stability limits.  
4063 The relevant equipment is in general given by the identifying terminal. A software application  
4064 that can do topology processing shall calculate the equipment belonging to the circuit, if there  
4065 are no stability limits associated to it. In case of stability limits, the containment reflects the  
4066 equipments that were used in the calculation/analysis.

4067 Table 410 shows all attributes of Circuit.

4068 **Table 410 – Attributes of ExtPowerTransferCorridor::Circuit**

name	mult	type	description
positiveFlowIn	0..1	Boolean	(NC) True, if the positive value on the terminal shall be considered flow into the circuit. False, if the positive value on the terminal shall be considered flow out of the circuit.
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4069

4070

Table 411 shows all association ends of Circuit with other classes.

4071

**Table 411 – Association ends of ExtPowerTransferCorridor::Circuit with other classes**

mult from	name	mult to	type	description
0..1	Equipment	0..*	Equipment	(NC) The equipment which is part of the circuit. This includes all equipment related to the circuit (e.g. If the circuit is a transformer, the equipment could be all switching and auxiliary equipments related to the transformer). A BusbarSection shall not be part of the circuit.
0..1	IdentifyingTerminal	0..1	Terminal	(NC) Terminal that identifies the circuit.
0..1	CircuitShare	0..*	<a href="#">CircuitShare</a>	(NC) The circuit share of the given power transfer corridor.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4072

### 3.13.3 (NC) CircuitShare

4074 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

4075 Defines the share of the circuit which is part of an associated power transfer corridor.

4076 Table 412 shows all attributes of CircuitShare.

4077

**Table 412 – Attributes of ExtPowerTransferCorridor::CircuitShare**

name	mult	type	description
contributionFactor	0..1	PerCent	(NC) Contribution factor for the circuit which is part of a power transfer corridor. The allowed value range is [0,100].
normalContributionFactor	0..1	PerCent	(NC) Normal contribution factor for the circuit which is part of a power transfer corridor. The allowed value range is [0,100].
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 413 shows all association ends of CircuitShare with other classes.

**Table 413 – Association ends of ExtPowerTransferCorridor::CircuitShare with other classes**

mult from	name	mult to	type	description
0..*	Circuit	0..1	<a href="#">Circuit</a>	(NC) The circuit that has a share of the power system corridor.
0..*	PowerTransferCorridor	1..1	<a href="#">PowerTransferCorridor</a>	(NC) The power transfer corridor that has this circuit share.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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### 3.13.4 (NC) ExceptionalPowerTransferCorridor

Inheritance path = [PowerTransferCorridor](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

Potential power transfer corridor that can be triggered by equipment which changes its in service status or it is operating in an island.

Table 414 shows all attributes of ExceptionalPowerTransferCorridor.

**Table 414 – Attributes of ExtPowerTransferCorridor::ExceptionalPowerTransferCorridor**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 415 shows all association ends of ExceptionalPowerTransferCorridor with other classes.

**Table 415 – Association ends of ExtPowerTransferCorridor::ExceptionalPowerTransferCorridor with other classes**

mult from	name	mult to	type	description
1..1	PTCTriggeredEquipment	1..*	<a href="#">PTCTriggeredEquipment</a>	(NC) The equipment that triggers this exceptional power transfer corridor.

mult from	name	mult to	type	description
0..1	OperationalLimitSet	0..*	OperationalLimitSet	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
0..1	AssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
1..1	PinPowerTransferCorridor	0..*	<a href="#">PinPowerTransferCorridor</a>	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
1..1	PTCActivePowerSupport	0..*	<a href="#">PTCActivePowerSupport</a>	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
1..1	CircuitShare	0..*	<a href="#">CircuitShare</a>	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4094

4095 **3.13.5 (NC) LineCircuit**4096 Inheritance path = [Circuit](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject4097 A line circuit is a circuit that has at least one ACLineSegment and may or may not include  
4098 related switching and/or auxiliary equipment.

4099 Table 416 shows all attributes of LineCircuit.

4100

**Table 416 – Attributes of ExtPowerTransferCorridor::LineCircuit**

name	mult	type	description
positiveFlowIn	0..1	Boolean	(NC) inherited from: <a href="#">Circuit</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4101

4102 Table 417 shows all association ends of LineCircuit with other classes.

**Table 417 – Association ends of ExtPowerTransferCorridor::LineCircuit with other classes**

4103

4104

mult from	name	mult to	type	description
0..1	Equipment	0..*	Equipment	(NC) inherited from: <a href="#">Circuit</a>

mult from	name	mult to	type	description
0..1	IdentifyingTerminal	0..1	Terminal	(NC) inherited from: <a href="#">Circuit</a>
0..1	CircuitShare	0..*	<a href="#">CircuitShare</a>	(NC) inherited from: <a href="#">Circuit</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4105

4106 **3.13.6 (NC) OrdinaryPowerTransferCorridor**4107 Inheritance path = [PowerTransferCorridor](#) : PowerSystemResource : IdentifiedObject :  
4108 ExtEulIdentifiedObject

4109 Power transfer corridor defined for normal operating network.

4110 Table 418 shows all attributes of OrdinaryPowerTransferCorridor.

4111 **Table 418 – Attributes of ExtPowerTransferCorridor::OrdinaryPowerTransferCorridor**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4112

4113 Table 419 shows all association ends of OrdinaryPowerTransferCorridor with other classes.

4114 **Table 419 – Association ends of**4115 **ExtPowerTransferCorridor::OrdinaryPowerTransferCorridor with other classes**

mult from	name	mult to	type	description
0..1	OperationalLimitSet	0..*	OperationalLimitSet	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
0..1	AssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
1..1	PinPowerTransferCorridor	0..*	<a href="#">PinPowerTransferCorridor</a>	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
1..1	PTCActivePowerSupport	0..*	<a href="#">PTCActivePowerSupport</a>	(NC) inherited from: <a href="#">PowerTransferCorridor</a>

mult from	name	mult to	type	description
1..1	CircuitShare	0..*	<a href="#">CircuitShare</a>	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) inherited from: <a href="#">PowerTransferCorridor</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4116

4117 **3.13.7 (NC) PowerTransferCorridor**

4118 Inheritance path = PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

4119 A power transfer corridor is defined as a set of circuits (transmission lines or transformers)  
4120 separating two portions of the power system, or a subset of circuits exposed to a substantial  
4121 portion of the transmission exchange between two parts of the system.

4122 Table 420 shows all attributes of PowerTransferCorridor.

4123

**Table 420 – Attributes of ExtPowerTransferCorridor::PowerTransferCorridor**

name	mult	type	description
enabled	0..1	Boolean	(NC) It enables/disables the monitoring/assessment of a power transfer corridor. True means that the monitoring of the power transfer corridor is assessed. False means the power transfer corridor is not assessed.
normalEnabled	0..1	Boolean	(NC) It is the normal enable/disable the monitoring/assessment of a power transfer corridor. True means that the monitoring of the power transfer corridor is assessed. False means the power transfer corridor is not assessed.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4124

4125 Table 421 shows all association ends of PowerTransferCorridor with other classes.

4126  
4127**Table 421 – Association ends of ExtPowerTransferCorridor::PowerTransferCorridor with other classes**

mult from	name	mult to	type	description
0..1	OperationalLimitSet	0..*	OperationalLimitSet	(NC) The operational limit set relevant for this power transfer corridor.
0..1	AssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) The assessed element indicating that the power transfer corridor is assessed, i.e. monitored.
1..1	PinPowerTransferCorridor	0..*	<a href="#">PinPowerTransferCorridor</a>	(NC) The pin that uses this input.
1..1	PTCActivePowerSupport	0..*	<a href="#">PTCActivePowerSupport</a>	(NC) The active power capability associated with this PowerTransferCorridor.
1..1	CircuitShare	0..*	<a href="#">CircuitShare</a>	(NC) The circuit share for this power transfer corridor.
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) Generic enabling schedule associated with a power transfer corridor.
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4128

**3.13.8 (NC) PowerTransformerCircuit**

4130 Inheritance path = [Circuit](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject  
 4131 A power transformer circuit is a circuit that has at least one PowerTransformer and may or may  
 4132 not include related switching and/or auxiliary equipment.

4133 Table 422 shows all attributes of PowerTransformerCircuit.

4134

**Table 422 – Attributes of ExtPowerTransferCorridor::PowerTransformerCircuit**

name	mult	type	description
positiveFlowIn	0..1	Boolean	(NC) inherited from: <a href="#">Circuit</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4135

4136 Table 423 shows all association ends of PowerTransformerCircuit with other classes.

4137 **Table 423 – Association ends of ExtPowerTransferCorridor::PowerTransformerCircuit**  
4138 **with other classes**

mult from	name	mult to	type	description
0..1	Equipment	0..*	Equipment	(NC) inherited from: <a href="#">Circuit</a>
0..1	IdentifyingTerminal	0..1	Terminal	(NC) inherited from: <a href="#">Circuit</a>
0..1	CircuitShare	0..*	<a href="#">CircuitShare</a>	(NC) inherited from: <a href="#">Circuit</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4139

### 4140 3.13.9 (NC) PTCTriggeredEquipment

4141 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

4142 Power Transfer Corridor triggered equipment connects the equipment that will create the  
4143 exceptional power transfer corridor when taking out of service. e.g. A system with three lines  
4144 gets an exceptional power transfer corridor when one of the lines is taken out of service.

4145 Table 424 shows all attributes of PTCTriggeredEquipment.

4146 **Table 424 – Attributes of ExtPowerTransferCorridor::PTCTriggeredEquipment**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4147

4148 Table 425 shows all association ends of PTCTriggeredEquipment with other classes.

4149 **Table 425 – Association ends of ExtPowerTransferCorridor::PTCTriggeredEquipment**  
4150 **with other classes**

mult from	name	mult to	type	description
0..*	Equipment	1..1	Equipment	(NC) The equipment which is part of power transfer corridor triggering.
1..*	ExceptionalPowerTransferCorridor	1..1	<a href="#">ExceptionalPowerTransferCorridor</a>	(NC) The power transfer corridor which is triggered by this equipment.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4151

4152 **3.13.10 (NC) DirectCurrentCircuit**4153 Inheritance path = [Circuit](#) : PowerSystemResource : IdentifiedObject : ExtEulIdentifiedObject

4154 A direct current circuit is a circuit consists of direct current equipment.

4155 Table 426 shows all attributes of DirectCurrentCircuit.

4156 **Table 426 – Attributes of ExtPowerTransferCorridor::DirectCurrentCircuit**

name	mult	type	description
positiveFlowIn	0..1	Boolean	(NC) inherited from: <a href="#">Circuit</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4157

4158 Table 427 shows all association ends of DirectCurrentCircuit with other classes.

4159 **Table 427 – Association ends of ExtPowerTransferCorridor::DirectCurrentCircuit with other classes**

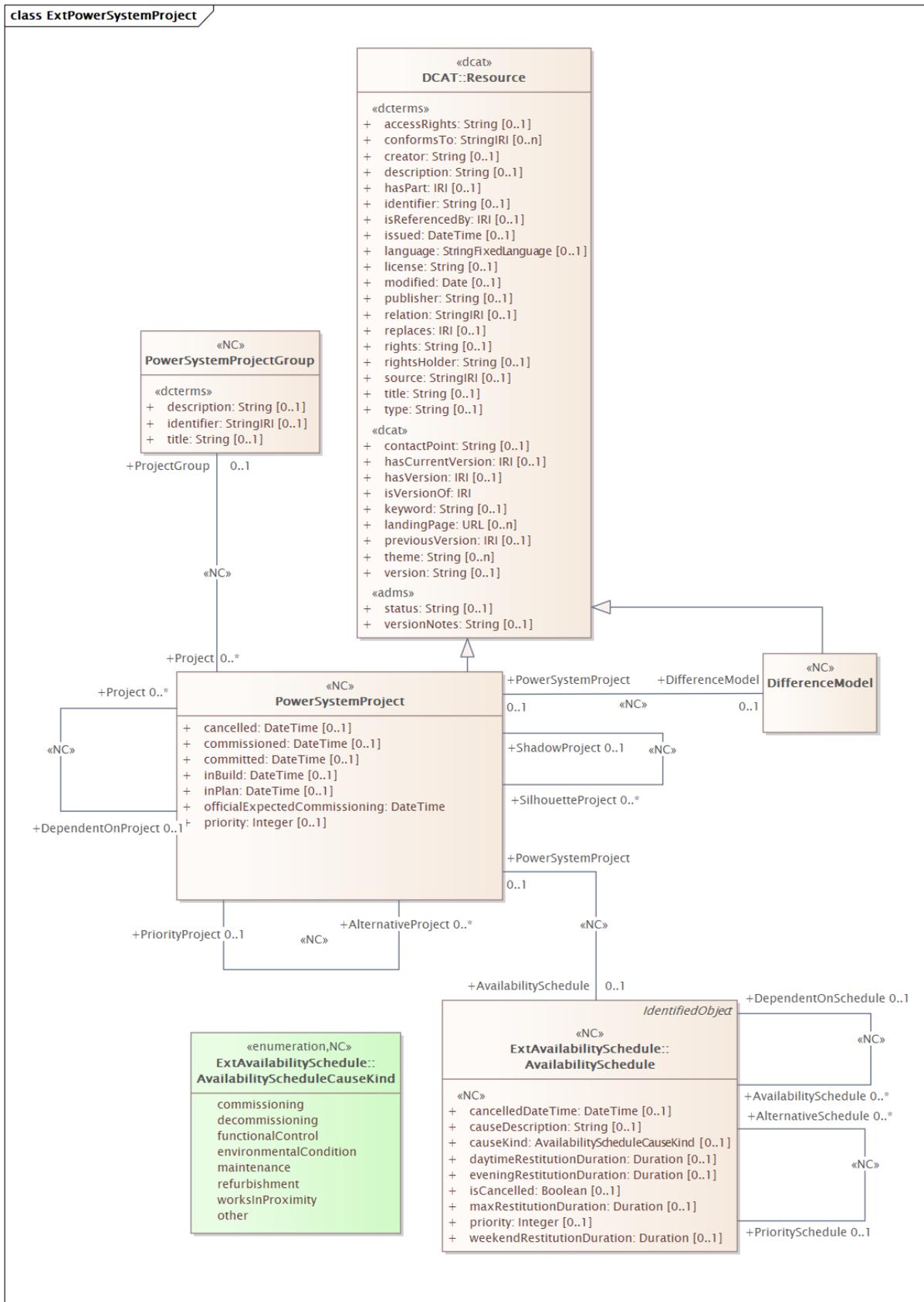
4160

mult from	name	mult to	type	description
0..1	Equipment	0..*	Equipment	(NC) inherited from: <a href="#">Circuit</a>
0..1	IdentifyingTerminal	0..1	Terminal	(NC) inherited from: <a href="#">Circuit</a>
0..1	CircuitShare	0..*	<a href="#">CircuitShare</a>	(NC) inherited from: <a href="#">Circuit</a>
0..*	PSRType	0..1	PSRType	inherited from: PowerSystemResource
0..1	Controls	0..*	Control	inherited from: PowerSystemResource
0..1	Measurements	0..*	Measurement	inherited from: PowerSystemResource
1..1	OperatingShare	0..*	OperatingShare	inherited from: PowerSystemResource
0..*	ReportingGroup	0..*	ReportingGroup	inherited from: PowerSystemResource
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4161

4162 **3.14 Package ExtPowerSystemProject**4163 **3.14.1 General**

4164 The package includes extensions related to power system project.



4165

4166

**Figure 42 – Class diagram ExtPowerSystemProject::ExtPowerSystemProject**

4167 Figure 42: The diagram shows the extensions related to power system project.

### 4168 3.14.2 (NC) DifferenceModel

4169 Inheritance path = Resource

4170 A set of statements describing the changes in the network model. The statement is defined in  
4171 the difference model.

4172 Table 428 shows all attributes of DifferenceModel.

4173 **Table 428 – Attributes of ExtPowerSystemProject::DifferenceModel**

name	mult	type	description
accessRights	0..1	String	(dcterms) inherited from: Resource
conformsTo	0..n	StringIRI	(dcterms) inherited from: Resource
contactPoint	0..1	String	(dcat) inherited from: Resource
creator	0..1	String	(dcterms) inherited from: Resource
description	0..1	String	(dcterms) inherited from: Resource
hasCurrentVersion	0..1	IRI	(dcat) inherited from: Resource
hasPart	0..1	IRI	(dcterms) inherited from: Resource
hasVersion	0..1	IRI	(dcat) inherited from: Resource
identifier	0..1	String	(dcterms) inherited from: Resource
isReferencedBy	0..1	IRI	(dcterms) inherited from: Resource
issued	0..1	DateTime	(dcterms) inherited from: Resource
isVersionOf	1..1	IRI	(dcat) inherited from: Resource
keyword	0..1	String	(dcat) inherited from: Resource
landingPage	0..n	URL	(dcat) inherited from: Resource
language	0..1	StringFixedLanguage	(dcterms) inherited from: Resource
license	0..1	String	(dcterms) inherited from: Resource
modified	0..1	Date	(dcterms) inherited from: Resource
previousVersion	0..1	IRI	(dcat) inherited from: Resource
publisher	0..1	String	(dcterms) inherited from: Resource
relation	0..1	StringIRI	(dcterms) inherited from: Resource
replaces	0..1	IRI	(dcterms) inherited from: Resource
rights	0..1	String	(dcterms) inherited from: Resource
rightsHolder	0..1	String	(dcterms) inherited from: Resource
status	0..1	String	(adms) inherited from: Resource
theme	0..n	String	(dcat) inherited from: Resource
title	0..1	String	(dcterms) inherited from: Resource
type	0..1	String	(dcterms) inherited from: Resource
version	0..1	String	(dcat) inherited from: Resource
versionNotes	0..1	String	(adms) inherited from: Resource
source	0..1	StringIRI	(dcterms) inherited from: Resource

4174

4175 Table 429 shows all association ends of DifferenceModel with other classes.

4176  
4177**Table 429 – Association ends of ExtPowerSystemProject::DifferenceModel with other classes**

mult from	name	mult to	type	description
0..1	PowerSystemProject	0..1	<a href="#">PowerSystemProject</a>	(NC) The power system project that is described by this difference model.
0..*	QualifiedRelation	0..1	Relationship	(dcat) inherited from: Resource
0..1	Relationship	0..*	Relationship	(dct) inherited from: Resource

4178

**3.14.3 (NC) PowerSystemProject**

4180 Inheritance path = Resource

4181 Knowledge data for the power system project that describe the status and the planned implementation of the changes into the as-built model.

4182 Table 430 shows all attributes of PowerSystemProject.

4184

**Table 430 – Attributes of ExtPowerSystemProject::PowerSystemProject**

name	mult	type	description
cancelled	0..1	DateTime	From this date the project is in cancelled state. No further development will be done to the project or associated change set in this state.
commissioned	0..1	DateTime	From this date the project is in commissioned state. Any conducting equipment in the change set can be energized from this day. No further changes will be done to the change set.
committed	0..1	DateTime	From this date the project is in committed state. The change set will from this day be part of the as-build model.
inBuild	0..1	DateTime	From this day the project is in build state. Alternative project have been evaluated. Any procurement has started and the change set is being updated to an as-build model.
inPlan	0..1	DateTime	From this date the project is in planning state. Study or procurement strategy has triggered the start of a project involving changes to one or more models. Alternative projects and change sets are evaluated.
priority	0..1	Integer	Priority between competing project. Use 0 for do not care. Use 1 for highest priority. Use 2 as priority is less than 1 and so on.
officialExpectedCommissioning	1..1	DateTime	Published official commissioning date.
accessRights	0..1	String	(dcterms) inherited from: Resource
conformsTo	0..n	StringIRI	(dcterms) inherited from: Resource
contactPoint	0..1	String	(dcat) inherited from: Resource
creator	0..1	String	(dcterms) inherited from: Resource
description	0..1	String	(dcterms) inherited from: Resource
hasCurrentVersion	0..1	IRI	(dcat) inherited from: Resource
hasPart	0..1	IRI	(dcterms) inherited from: Resource
hasVersion	0..1	IRI	(dcat) inherited from: Resource
identifier	0..1	String	(dcterms) inherited from: Resource
isReferencedBy	0..1	IRI	(dcterms) inherited from: Resource

name	mult	type	description
issued	0..1	DateTime	(dcterms) inherited from: Resource
isVersionOf	1..1	IRI	(dcat) inherited from: Resource
keyword	0..1	String	(dcat) inherited from: Resource
landingPage	0..n	URL	(dcat) inherited from: Resource
language	0..1	StringFixedLanguage	(dcterms) inherited from: Resource
license	0..1	String	(dcterms) inherited from: Resource
modified	0..1	Date	(dcterms) inherited from: Resource
previousVersion	0..1	IRI	(dcat) inherited from: Resource
publisher	0..1	String	(dcterms) inherited from: Resource
relation	0..1	StringIRI	(dcterms) inherited from: Resource
replaces	0..1	IRI	(dcterms) inherited from: Resource
rights	0..1	String	(dcterms) inherited from: Resource
rightsHolder	0..1	String	(dcterms) inherited from: Resource
status	0..1	String	(adms) inherited from: Resource
theme	0..n	String	(dcat) inherited from: Resource
title	0..1	String	(dcterms) inherited from: Resource
type	0..1	String	(dcterms) inherited from: Resource
version	0..1	String	(dcat) inherited from: Resource
versionNotes	0..1	String	(adms) inherited from: Resource
source	0..1	StringIRI	(dcterms) inherited from: Resource

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Table 431 shows all association ends of PowerSystemProject with other classes.

**Table 431 – Association ends of ExtPowerSystemProject::PowerSystemProject with other classes**

mult from	name	mult to	type	description
0..1	AvailabilitySchedule	0..1	<a href="#">AvailabilitySchedule</a>	(NC) The availability schedule associated with this power system project.
0..1	DifferenceModel	0..1	<a href="#">DifferenceModel</a>	(NC) The difference model describing this power system project.
0..*	ProjectGroup	0..1	<a href="#">PowerSystemProjectGroup</a>	(NC) Power system project group to which this project belongs.
0..*	DependentOnProject	0..1	<a href="#">PowerSystemProject</a>	(NC) Grouping of projects that are depending on each other. A project can only be linked to one dependent project.
0..*	ShadowProject	0..1	<a href="#">PowerSystemProject</a>	(NC) A shadowing project that includes the same change set, but different timeline.
0..1	AlternativeProject	0..*	<a href="#">PowerSystemProject</a>	(NC) Alternative project. Only one of the projects will be commissioned.
0..1	Project	0..*	<a href="#">PowerSystemProject</a>	(NC) The project that has a dependent on project.
0..1	SilhouetteProject	0..*	<a href="#">PowerSystemProject</a>	(NC) The project that has a shadow project.

mult from	name	mult to	type	description
0..*	PriorityProject	0..1	<a href="#">PowerSystemProject</a>	(NC) The project that has an alternative project.
0..*	QualifiedRelation	0..1	Relationship	(dcat) inherited from: Resource
0..1	Relationship	0..*	Relationship	(dct) inherited from: Resource

4189

4190 **3.14.4 (NC) PowerSystemProjectGroup root class**

4191 A container with project that are grouped together. Primarily used for navigation and to highlight  
4192 the phases that an overall project can go through.

4193 Table 432 shows all attributes of PowerSystemProjectGroup.

4194 **Table 432 – Attributes of ExtPowerSystemProject::PowerSystemProjectGroup**

name	mult	type	description
description	0..1	String	(dcterms) A free-text account of the resource. Description may include but is not limited to: an abstract, a table of contents, a graphical representation, or a free-text account of the resource.
identifier	0..1	StringIRI	(dcterms) A unique identifier of the resource being described or cataloged. The identifier might be used as part of the IRI of the resource, but still having it represented explicitly is useful. The identifier is a text string which is assigned to the resource to provide an unambiguous reference within a particular context.
title	0..1	String	(dcterms) A name given to the resource.

4195

4196 Table 433 shows all association ends of PowerSystemProjectGroup with other classes.

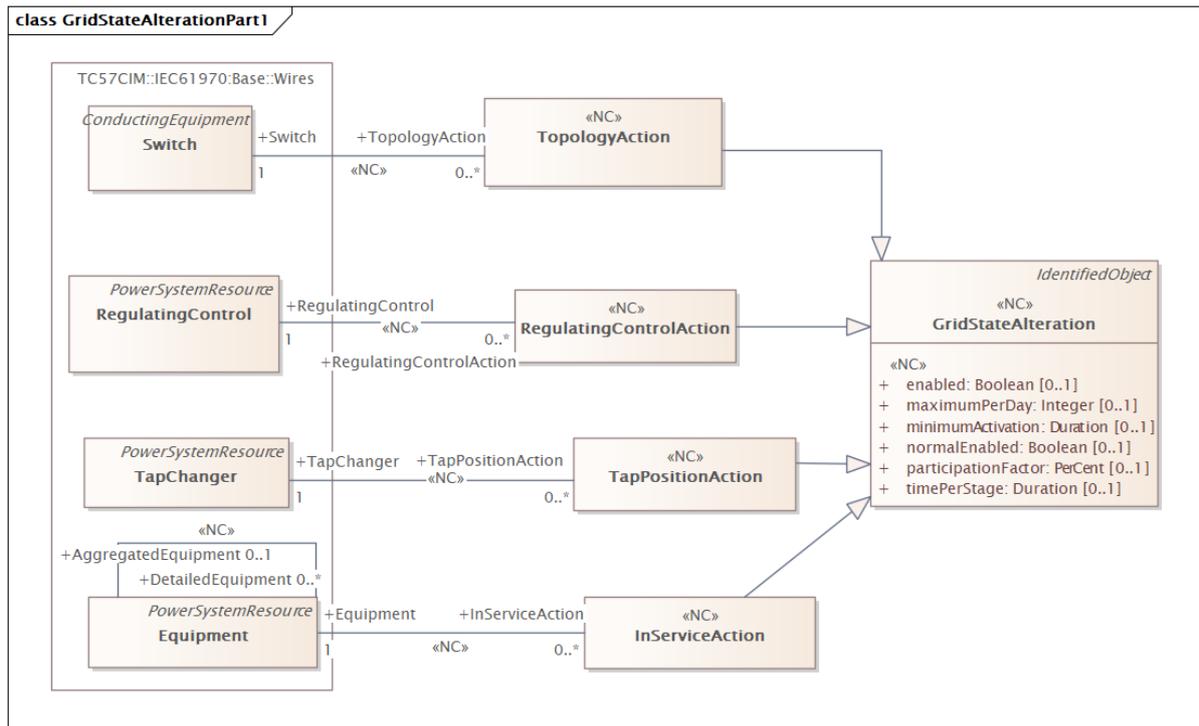
4197 **Table 433 – Association ends of ExtPowerSystemProject::PowerSystemProjectGroup**  
4198 **with other classes**

mult from	name	mult to	type	description
0..1	Project	0..*	<a href="#">PowerSystemProject</a>	(NC) The project included in the power system project group.

4199

4200 **3.15 Remedial action extensions**4201 **3.15.1 General**

4202 This package contains the extensions related to the remedial action.



4203

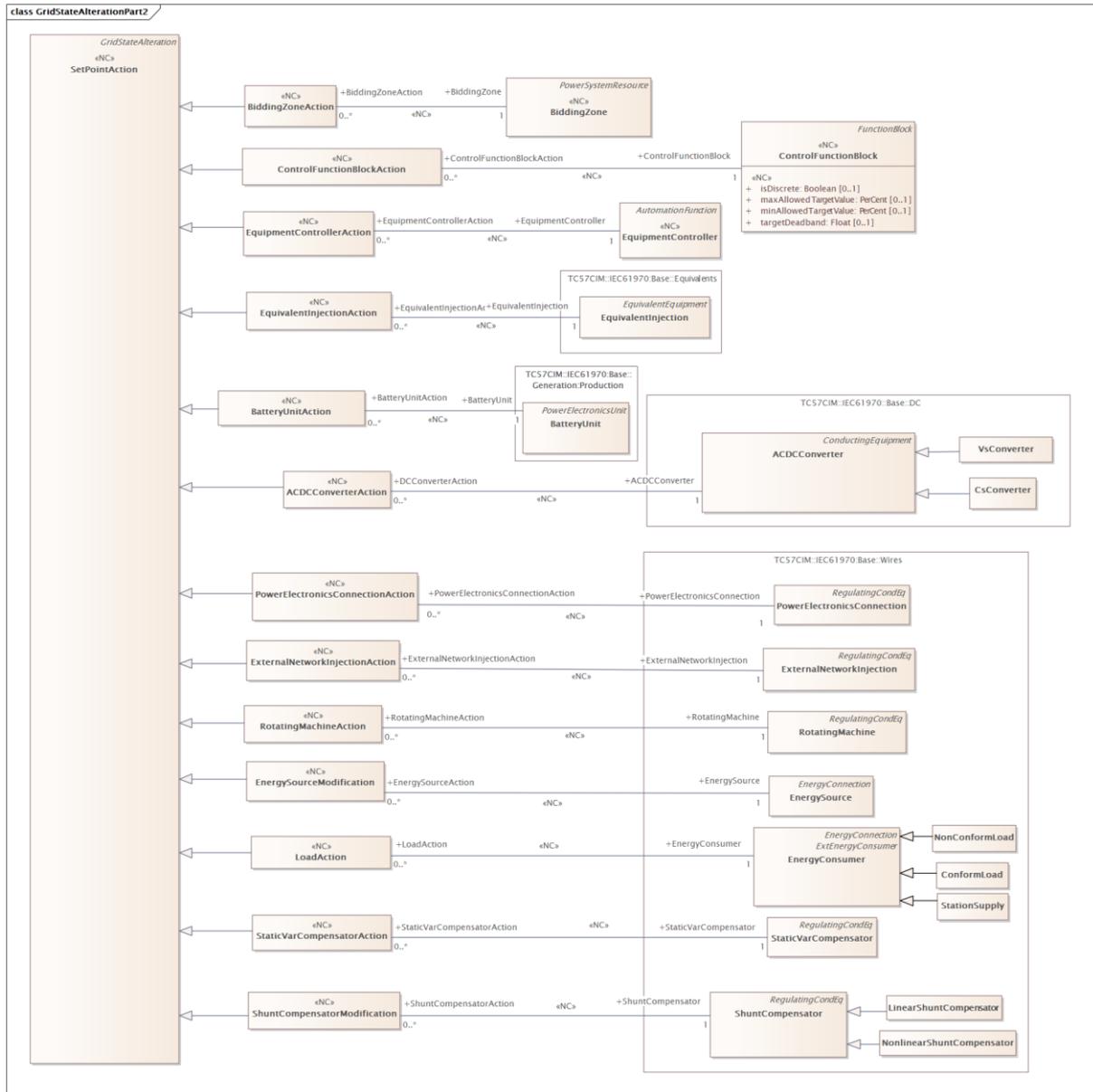
4204

**Figure 43 – Class diagram ExtRemedialAction::GridStateAlterationPart1**

4205

Figure 43: This diagram contains extended classes for the purpose of the remedial action data exchange.

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4207

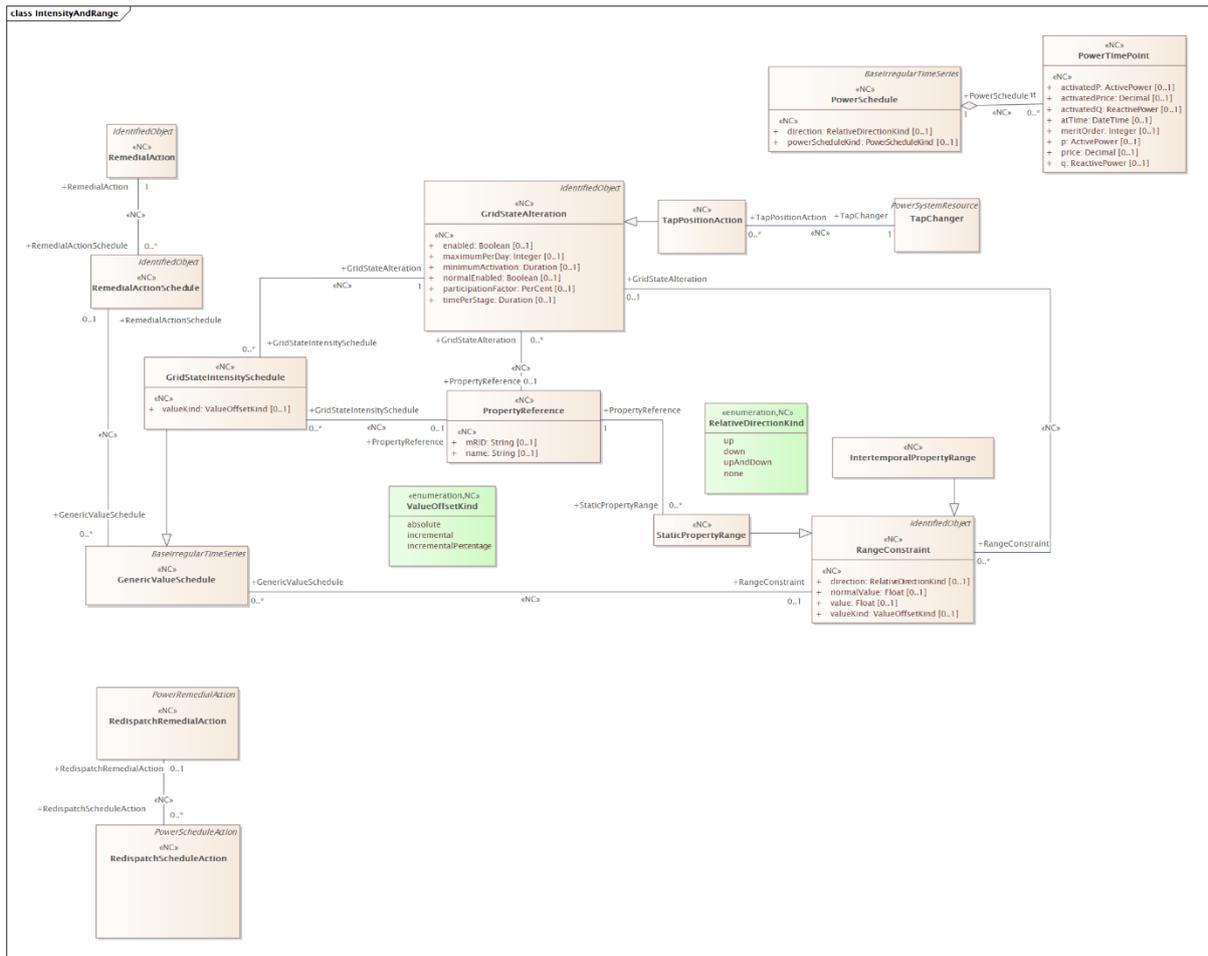
4208

**Figure 44 – Class diagram ExtRemedialAction::GridStateAlterationPart2**

4209

Figure 44: This diagram contains extended classes for the purpose of the remedial action data exchange.

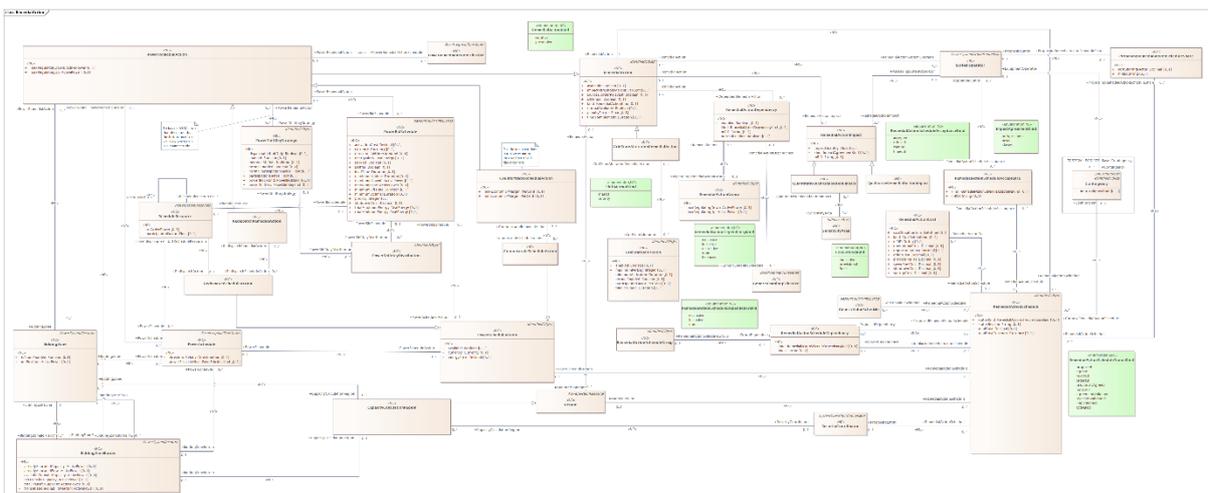
4210



4211

4212 **Figure 45 – Class diagram ExtRemedialAction::IntensityAndRange**

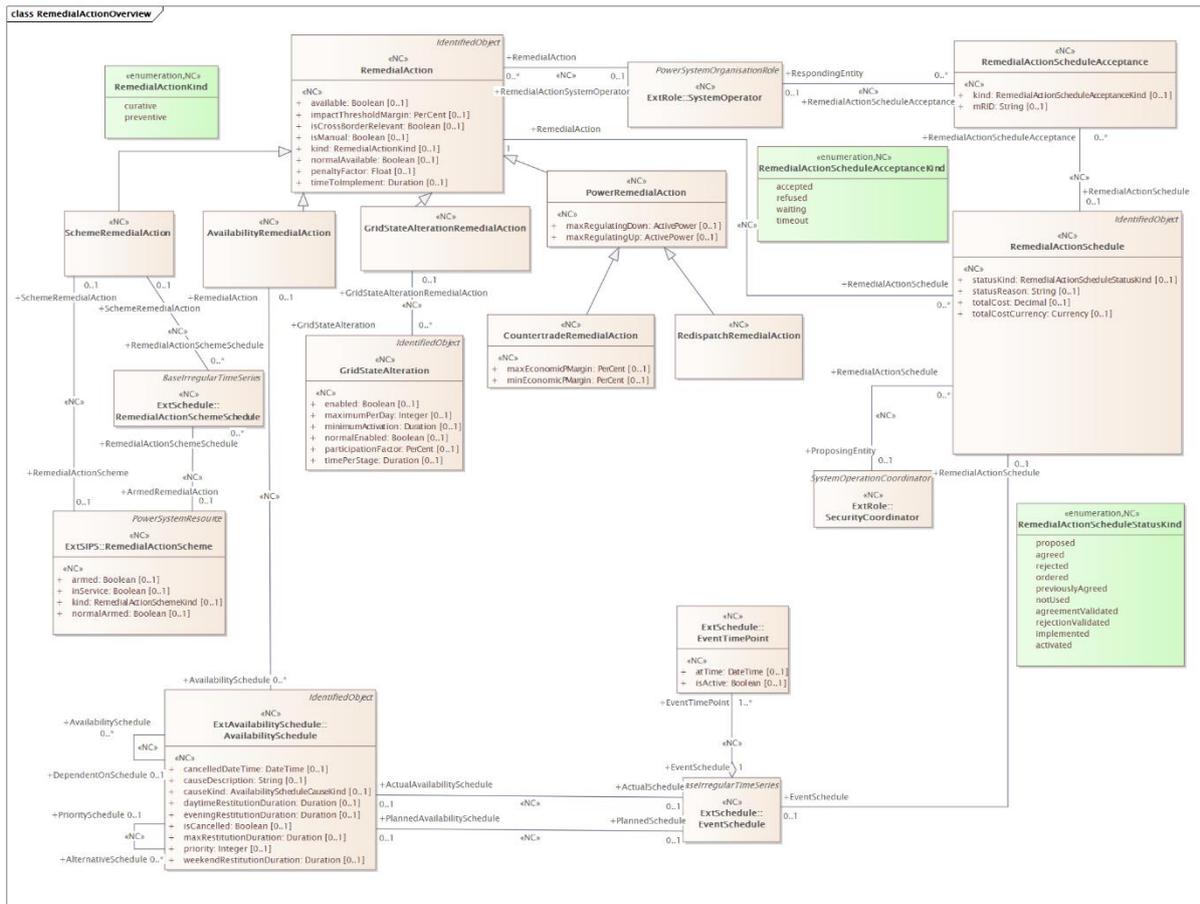
4213 Figure 45: This diagram contains extended classes related to the modelling of static, dynamic  
4214 ranges and intensity.



4215

4216 **Figure 46 – Class diagram ExtRemedialAction::RemedialAction**

4217 Figure 46: The diagram contains main classes related to the remedial action.



4218  
4219 **Figure 47 – Class diagram ExtRemedialAction::RemedialActionOverview**

4220 Figure 47: The diagram is an overview of the remedial action related extensions.

4221 **3.15.2 (NC) ACDCConverterAction**

4222 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :  
4223 ExtEulIdentifiedObject

4224 Alternate current Direct current (ACDC) converter action.

4225 Table 434 shows all attributes of ACDCConverterAction.

4226 **Table 434 – Attributes of ExtRemedialAction::ACDCConverterAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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4228

Table 435 shows all association ends of ACDCConverterAction with other classes.

4229

4230

**Table 435 – Association ends of ExtRemedialAction::ACDCConverterAction with other classes**

mult from	name	mult to	type	description
0..*	ACDCConverter	1..1	ACDCConverter	(NC) The ACDCConverter that is associated with an action.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4231

4232

### 3.15.3 (NC) AvailabilityRemedialAction

4233

Inheritance path = [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject

4234

Availability remedial action is a remedial action that cancels or reschedules an availability schedule.

4235

4236

Table 436 shows all attributes of AvailabilityRemedialAction.

4237

**Table 436 – Attributes of ExtRemedialAction::AvailabilityRemedialAction**

name	mult	type	description
available	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
kind	0..1	<a href="#">RemedialActionKind</a>	(NC) inherited from: <a href="#">RemedialAction</a>
penaltyFactor	0..1	Float	(NC) inherited from: <a href="#">RemedialAction</a>
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
isManual	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
timeToImplement	0..1	Duration	(NC) inherited from: <a href="#">RemedialAction</a>
normalAvailable	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
impactThresholdMargin	0..1	PerCent	(NC) inherited from: <a href="#">RemedialAction</a>
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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4239

Table 437 shows all association ends of AvailabilityRemedialAction with other classes.

4240

**Table 437 – Association ends of ExtRemedialAction::AvailabilityRemedialAction with other classes**

4241

mult from	name	mult to	type	description
0..1	AvailabilitySchedule	0..*	<a href="#">AvailabilitySchedule</a>	(NC) Availability schedule that is part of the remedial action.
0..1	ContingencyWithRemedialAction	0..*	<a href="#">ContingencyWithRemedialAction</a>	(NC) inherited from: <a href="#">RemedialAction</a>
1..1	RemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	DependentRemedialAction	0..*	<a href="#">RemedialActionDependency</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	GenericAvailableSchedule	0..*	<a href="#">GenericAvailableSchedule</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	ImpactedOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	AppointedToOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	AppointedToRegion	0..1	<a href="#">Region</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	AssessedElementWithRemedialAction	0..*	<a href="#">AssessedElementWithRemedialAction</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	RemedialActionOutcomeValue	0..*	<a href="#">RemedialActionOutcomeValue</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	RemedialActionSystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	RemedialActionImpact	0..*	<a href="#">RemedialActionImpact</a>	(NC) inherited from: <a href="#">RemedialAction</a>
1..1	RemedialActionApplied	0..*	<a href="#">RemedialActionApplied</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4242

### 4243 3.15.4 (NC) BatteryUnitAction

4244 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :  
4245 ExtEulIdentifiedObject

4246 Battery unit setpoint action.

4247 Table 438 shows all attributes of BatteryUnitAction.

4248

**Table 438 – Attributes of ExtRemedialAction::BatteryUnitAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 439 shows all association ends of BatteryUnitAction with other classes.

4251

4252

**Table 439 – Association ends of ExtRemedialAction::BatteryUnitAction with other classes**

mult from	name	mult to	type	description
0..*	BatteryUnit	1..1	BatteryUnit	(NC) The BatteryUnit that is associated with an action.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4253

**3.15.5 (NC) CountertradeRemedialAction**

Inheritance path = [PowerRemedialAction](#) : [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject

Countertrade is a remedial action to relieve physical congestions where the location of activated resources within the bidding zone is not known.

4259 Table 440 shows all attributes of CountertradeRemedialAction.

4260 **Table 440 – Attributes of ExtRemedialAction::CountertradeRemedialAction**

name	mult	type	description
maxEconomicPMargin	0..1	PerCent	(NC) High economic active power limit given by the percentage of the relevant units operating p. e.g. If a generating unit (G1) with maximum operating active power of 100 MW and a conform load with active maximum load of 50 MW (L1). Max economic p margin of 90% will give the limit of the shift key to be 90 MW for the G1 and 45 MW for the L1. The allowed value range is [0,100].
minEconomicPMargin	0..1	PerCent	(NC) Low economic active power limit given by the percentage of the relevant units operating p. e.g. If a generating unit (G1) with minimum operating active power of 10 MW and a conform load with active maximum load of 5 MW (L1). Min economic p margin of 90% will give the limit of the shift key to be 11 MW for the G1 and 5.5 MW for the L1. The allowed value range is [0,100].
maxRegulatingDown	0..1	ActivePower	(NC) inherited from: <a href="#">PowerRemedialAction</a>
maxRegulatingUp	0..1	ActivePower	(NC) inherited from: <a href="#">PowerRemedialAction</a>
available	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
kind	0..1	<a href="#">RemedialActionKind</a>	(NC) inherited from: <a href="#">RemedialAction</a>
penaltyFactor	0..1	Float	(NC) inherited from: <a href="#">RemedialAction</a>
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
isManual	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
timeToImplement	0..1	Duration	(NC) inherited from: <a href="#">RemedialAction</a>
normalAvailable	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
impactThresholdMargin	0..1	PerCent	(NC) inherited from: <a href="#">RemedialAction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4261

4262 Table 441 shows all association ends of CountertradeRemedialAction with other classes.

4263 **Table 441 – Association ends of ExtRemedialAction::CountertradeRemedialAction with**  
4264 **other classes**

mult from	name	mult to	type	description
0..1	CountertradeScheduleAction	0..*	<a href="#">CountertradeScheduleAction</a>	(NC) Countertrade schedule action which belongs to a countertrade remedial action.
0..*	BiddingZone	0..1	<a href="#">BiddingZone</a>	(NC) inherited from: <a href="#">PowerRemedialAction</a>
0..*	BiddingZoneBorder	0..1	<a href="#">BiddingZoneBorder</a>	(NC) inherited from: <a href="#">PowerRemedialAction</a>

mult from	name	mult to	type	description
0..1	PowerShiftKeyStrategy	0..*	<a href="#">PowerShiftKeyStrategy</a>	(NC) inherited from: <a href="#">PowerRemedialAction</a>
0..1	PowerBidSchedule	0..*	<a href="#">PowerBidSchedule</a>	(NC) inherited from: <a href="#">PowerRemedialAction</a>
0..1	PowerRemedialActionSchedule	0..*	<a href="#">PowerRemedialActionSchedule</a>	(NC) inherited from: <a href="#">PowerRemedialAction</a>
0..1	PowerSchedule	0..*	<a href="#">PowerSchedule</a>	(NC) inherited from: <a href="#">PowerRemedialAction</a>
0..1	ContingencyWithRemedialAction	0..*	<a href="#">ContingencyWithRemedialAction</a>	(NC) inherited from: <a href="#">RemedialAction</a>
1..1	RemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	DependentRemedialAction	0..*	<a href="#">RemedialActionDependency</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	GenericAvailableSchedule	0..*	<a href="#">GenericAvailableSchedule</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	ImpactedOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	AppointedToOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	AppointedToRegion	0..1	<a href="#">Region</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	AssessedElementWithRemedialAction	0..*	<a href="#">AssessedElementWithRemedialAction</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	RemedialActionOutcomeValue	0..*	<a href="#">RemedialActionOutcomeValue</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	RemedialActionSystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	RemedialActionImpact	0..*	<a href="#">RemedialActionImpact</a>	(NC) inherited from: <a href="#">RemedialAction</a>
1..1	RemedialActionApplied	0..*	<a href="#">RemedialActionApplied</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4265

4266 **3.15.6 (NC) ControlFunctionBlockAction**4267 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :  
4268 ExtEulIdentifiedObject

4269 Action for setting the control function block target values.

4270 Table 442 shows all attributes of ControlFunctionBlockAction.

4271 **Table 442 – Attributes of ExtRemedialAction::ControlFunctionBlockAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>

name	mult	type	description
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 443 shows all association ends of ControlFunctionBlockAction with other classes.

**Table 443 – Association ends of ExtRemedialAction::ControlFunctionBlockAction with other classes**

mult from	name	mult to	type	description
0..*	ControlFunctionBlock	1..1	<a href="#">ControlFunctionBlock</a>	(NC) The control function block that is associated with a ControlFunctionBlockAction.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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### 3.15.7 (NC) EnergySourceModification

Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject

Energy source action.

Table 444 shows all attributes of EnergySourceModification.

**Table 444 – Attributes of ExtRemedialAction::EnergySourceModification**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>

name	mult	type	description
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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4284

Table 445 shows all association ends of EnergySourceModification with other classes.

4285

**Table 445 – Association ends of ExtRemedialAction::EnergySourceModification with other classes**

4286

mult from	name	mult to	type	description
0..*	EnergySource	1..1	EnergySource	(NC) The EnergySource which is associated with an EnergySourceAction.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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### 3.15.8 (NC) EquivalentInjectionAction

4289

Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :

4290

ExtEulIdentifiedObject

4291

Equivalent injection action.

4292

Table 446 shows all attributes of EquivalentInjectionAction.

4293

**Table 446 – Attributes of ExtRemedialAction::EquivalentInjectionAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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4295

Table 447 shows all association ends of EquivalentInjectionAction with other classes.

4296

**Table 447 – Association ends of ExtRemedialAction::EquivalentInjectionAction with other classes**

4297

mult from	name	mult to	type	description
0..*	EquivalentInjection	1..1	EquivalentInjection	(NC) The EquivalentInjection that is associated with an action.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4298

**3.15.9 (NC) ExternalNetworkInjectionAction**

4299 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :  
4301 ExtEulIdentifiedObject

4302 External network injection action.

4303 Table 448 shows all attributes of ExternalNetworkInjectionAction.

4304

**Table 448 – Attributes of ExtRemedialAction::ExternalNetworkInjectionAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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4306

Table 449 shows all association ends of ExternalNetworkInjectionAction with other classes.

4307

**Table 449 – Association ends of ExtRemedialAction::ExternalNetworkInjectionAction with other classes**

4308

mult from	name	mult to	type	description
0..*	ExternalNetworkInjection	1..1	ExternalNetworkInjection	(NC) The ExternalNetworkInjection that is associated with an action.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4309

4310

**3.15.10 (NC) GridStateAlteration**

4311

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

4312

Grid state alteration is a change of values describing state (operating point) of one element in the grid model compared to the base case.

4313

4314

Table 450 shows all attributes of GridStateAlteration.

4315

**Table 450 – Attributes of ExtRemedialAction::GridStateAlteration**

name	mult	type	description
enabled	0..1	Boolean	(NC) The status of the GridStateAlteration set by an operation or by a signal resulting from a control action.
normalEnabled	0..1	Boolean	(NC) The default/normal value used when other active signal/values are missing.
participationFactor	0..1	PerCent	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.  In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ .  In the case of priority strategy, the item with the lowest number gets allocated energy first.  e.g. If 0 this grid alteration does not participate. The sum of all participation factors for all grid state alterations associated with same remedial action shall be equal to 100%.
maximumPerDay	0..1	Integer	(NC) Maximum number of alterations per day.
minimumActivation	0..1	Duration	(NC) Minimum time duration between activating the same grid state alteration.
timePerStage	0..1	Duration	(NC) Time to implement a stage of a grid state alteration. If a grid state alteration consists of multiple stages (e.g. A step on a power transformer), this duration comes in addition to the timeToImplement and need to be multiplied by the number of stages. A stage can also be defined as MW in the case of regulating production.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4316

4317

Table 451 shows all association ends of GridStateAlteration with other classes.

4318

4319

**Table 451 – Association ends of ExtRemedialAction::GridStateAlteration with other classes**

mult from	name	mult to	type	description
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) Availability enabled describes the enabling or disabling of this grid state alteration.
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) The collection that has a GridStateAlteration.
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) The property reference for this grid state alteration.

mult from	name	mult to	type	description
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) The intensity associated with a given GridStateAlterationSchedule.
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) The grid state alteration remedial action associated with a given grid state alteration.
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) The controllable quantity associated with this grid state alteration.
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) The range constraint associated with a given GridStateAlteration.
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) Grid state alteration schedule associated with a grid state alteration.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4320

4321 **3.15.11 (NC) GridStateAlterationRemedialAction**4322 Inheritance path = [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject

4323 Grid state alteration remedial action describes one or many grid state alterations applied to a grid model state or a particular scenario in order to resolve one or more identified constraints.

4325 Table 452 shows all attributes of GridStateAlterationRemedialAction.

4326 **Table 452 – Attributes of ExtRemedialAction::GridStateAlterationRemedialAction**

name	mult	type	description
available	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
kind	0..1	<a href="#">RemedialActionKind</a>	(NC) inherited from: <a href="#">RemedialAction</a>
penaltyFactor	0..1	Float	(NC) inherited from: <a href="#">RemedialAction</a>
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
isManual	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
timeToImplement	0..1	Duration	(NC) inherited from: <a href="#">RemedialAction</a>
normalAvailable	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
impactThresholdMargin	0..1	PerCent	(NC) inherited from: <a href="#">RemedialAction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4327

4328 Table 453 shows all association ends of GridStateAlterationRemedialAction with other classes.

4329 **Table 453 – Association ends of ExtRemedialAction::GridStateAlterationRemedialAction**  
4330 **with other classes**

mult from	name	mult to	type	description
0..1	GridStateAlteration	0..*	<a href="#">GridStateAlteration</a>	(NC) The grid state alteration which is part of the grid state alteration remedial action.
0..1	ContingencyWithRemedialAction	0..*	<a href="#">ContingencyWithRemedialAction</a>	(NC) inherited from: <a href="#">RemedialAction</a>
1..1	RemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	DependentRemedialAction	0..*	<a href="#">RemedialActionDependency</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	GenericAvailableSchedule	0..*	<a href="#">GenericAvailableSchedule</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	ImpactedOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	AppointedToOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	AppointedToRegion	0..1	<a href="#">Region</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	AssessedElementWithRemedialAction	0..*	<a href="#">AssessedElementWithRemedialAction</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	RemedialActionOutcomeValue	0..*	<a href="#">RemedialActionOutcomeValue</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	RemedialActionSystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	RemedialActionImpact	0..*	<a href="#">RemedialActionImpact</a>	(NC) inherited from: <a href="#">RemedialAction</a>
1..1	RemedialActionApplied	0..*	<a href="#">RemedialActionApplied</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4331

### 4332 3.15.12 (NC) GridStateIntensitySchedule

4333 Inheritance path = [GenericValueSchedule](#) : [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) :  
4334 IdentifiedObject : ExtEulIdentifiedObject

4335 Defines the intensity applied for a given grid state alteration. It is primarily used in exchanges  
4336 related to the remedial action schedule. The value provided by the schedule replaces the value  
4337 of the attribute to which the schedule refers to.

4338 Table 454 shows all attributes of GridStateIntensitySchedule.

4339 **Table 454 – Attributes of ExtRemedialAction::GridStateIntensitySchedule**

name	mult	type	description
valueKind	0..1	<a href="#">ValueOffsetKind</a>	(NC) The kind of value1 and value2 of the associated IrregularIntervalSchedule.
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>

name	mult	type	description
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4340

4341

Table 455 shows all association ends of GridStateIntensitySchedule with other classes.

4342

**Table 455 – Association ends of ExtRemedialAction::GridStateIntensitySchedule with other classes**

4343

mult from	name	mult to	type	description
0..*	GridStateAlteration	1..1	<a href="#">GridStateAlteration</a>	(NC) The grid state alteration which has intensity.
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) The property reference for this grid schedule.
0..*	RemedialActionSchedule	0..1	<a href="#">RemedialActionSchedule</a>	(NC) inherited from: <a href="#">GenericValueSchedule</a>
0..*	RangeConstraint	0..1	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GenericValueSchedule</a>
1..1	GenericValueTimePoint	1..*	<a href="#">GenericValueTimePoint</a>	(NC) inherited from: <a href="#">GenericValueSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4344

### 4345 3.15.13 (NC) IntertemporalPropertyRange

4346 Inheritance path = [RangeConstraint](#) : IdentifiedObject : ExtEulIdentifiedObject

4347 It represents the intertemporal range, which means that this is the maximum change of an  
4348 attribute value between two time stamps or per time unit (e.g. hour). Both up and down  
4349 directions are defined by the direction attribute, i.e. There are different schedules per direction.

4350 The class is not instantiated for PropertyReference which refers to Boolean type attributes.

4351 For instance the following example illustrates the approach:

4352 - A tap changer related grid state alteration having two intertemporal range schedules.

4353 - For a particular point in time, the value from up schedule is 6 and the value from down  
4354 schedule is 3.

4355 - Then, the GridStateIntensity for the same point in time cannot be more than plus 6 taps from  
4356 the current, or more than minus 3 taps from the current.

4357 Table 456 shows all attributes of IntertemporalPropertyRange.

4358 **Table 456 – Attributes of ExtRemedialAction::IntertemporalPropertyRange**

name	mult	type	description
valueKind	0..1	<a href="#">ValueOffsetKind</a>	(NC) inherited from: <a href="#">RangeConstraint</a>
direction	0..1	<a href="#">RelativeDirectionKind</a>	(NC) inherited from: <a href="#">RangeConstraint</a>
value	0..1	Float	(NC) inherited from: <a href="#">RangeConstraint</a>
normalValue	0..1	Float	(NC) inherited from: <a href="#">RangeConstraint</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4359  
4360 Table 457 shows all association ends of IntertemporalPropertyRange with other classes.

4361 **Table 457 – Association ends of ExtRemedialAction::IntertemporalPropertyRange with**  
4362 **other classes**

mult from	name	mult to	type	description
0..*	GridStateAlteration	0..1	<a href="#">GridStateAlteration</a>	(NC) inherited from: <a href="#">RangeConstraint</a>
0..1	GenericValueSchedule	0..*	<a href="#">GenericValueSchedule</a>	(NC) inherited from: <a href="#">RangeConstraint</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4363  
4364 **3.15.14 (NC) LoadAction**

4365 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :  
4366 ExtEulIdentifiedObject  
4367 Load action.

4368 Table 458 shows all attributes of LoadAction.

4369 **Table 458 – Attributes of ExtRemedialAction::LoadAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4370

4371 Table 459 shows all association ends of LoadAction with other classes.

4372

**Table 459 – Association ends of ExtRemedialAction::LoadAction with other classes**

mult from	name	mult to	type	description
0..*	EnergyConsumer	1..1	EnergyConsumer	(NC) The EnergyConsumer that is associated with a load action.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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**4374 3.15.15 (NC) PowerElectronicsConnectionAction**4375 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :  
4376 ExtEulIdentifiedObject

4377 Power electronics setpoint action.

4378 Table 460 shows all attributes of PowerElectronicsConnectionAction.

4379

**Table 460 – Attributes of ExtRemedialAction::PowerElectronicsConnectionAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 461 shows all association ends of PowerElectronicsConnectionAction with other classes.

**Table 461 – Association ends of ExtRemedialAction::PowerElectronicsConnectionAction with other classes**

mult from	name	mult to	type	description
0..*	PowerElectronicsConnection	1..1	PowerElectronicsConnection	(NC) The PowerElectronicsConnection that is applied to an action.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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**3.15.16 (NC) PropertyReference root class**

The reference to a class and one of its properties.  
Table 462 shows all attributes of PropertyReference.

**Table 462 – Attributes of ExtRemedialAction::PropertyReference**

name	mult	type	description
name	0..1	String	(NC) Describes the property as combination of the class and one of its attributes names (e.g. PowerElectronicsConnection.p ).
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

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Table 463 shows all association ends of PropertyReference with other classes.

**Table 463 – Association ends of ExtRemedialAction::PropertyReference with other classes**

mult from	name	mult to	type	description
1..1	PinEquipment	0..*	<a href="#">PinEquipment</a>	(NC) The pin equipment that has this property reference.
0..1	GridStateAlteration	0..*	<a href="#">GridStateAlteration</a>	(NC) The grid state alteration for this property reference.
0..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) The grid schedule for this property reference.
1..1	StaticPropertyRange	0..*	<a href="#">StaticPropertyRange</a>	Static property range that has this property reference.
0..1	FunctionOutputVariable	0..*	<a href="#">FunctionOutputVariable</a>	(NC) Function output variable is the function output this property reference is used in.

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### 3.15.17 (NC) QualitativeRemedialActionImpact

Inheritance path = [RemedialActionImpact](#)

Defines the qualitative impact for a remedial action. Relevant remedial action is assumed to have impact when the impact quantity is applied.

Table 464 shows all attributes of QualitativeRemedialActionImpact.

**Table 464 – Attributes of ExtRemedialAction::QualitativeRemedialActionImpact**

name	mult	type	description
impactQuantity	0..1	Float	(NC) inherited from: <a href="#">RemedialActionImpact</a>
kind	0..1	<a href="#">ImpactAgreementKind</a>	(NC) inherited from: <a href="#">RemedialActionImpact</a>
mRID	0..1	String	(NC) inherited from: <a href="#">RemedialActionImpact</a>

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Table 465 shows all association ends of QualitativeRemedialActionImpact with other classes.

**Table 465 – Association ends of ExtRemedialAction::QualitativeRemedialActionImpact with other classes**

mult from	name	mult to	type	description
0..*	RemedialAction	0..1	<a href="#">RemedialAction</a>	(NC) inherited from: <a href="#">RemedialActionImpact</a>
0..*	AssessingSystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">RemedialActionImpact</a>
0..1	OwnerRemedialActionAssessment	0..*	<a href="#">OwnerRemedialActionAssessment</a>	(NC) inherited from: <a href="#">RemedialActionImpact</a>

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### 3.15.18 (NC) QuantitativeRemedialActionImpact

Inheritance path = [RemedialActionImpact](#)

Defines the quantitative impact for a remedial action. The value if the impact quantity is derived through offline calculation that has caused an impact of an element that is monitored by the assessed system operator higher than the relevant threshold for the conducting equipment.

Table 466 shows all attributes of QuantitativeRemedialActionImpact.

4411 **Table 466 – Attributes of ExtRemedialAction::QuantitativeRemedialActionImpact**

name	mult	type	description
impactQuantity	0..1	Float	(NC) inherited from: <a href="#">RemedialActionImpact</a>
kind	0..1	<a href="#">ImpactAgreementKind</a>	(NC) inherited from: <a href="#">RemedialActionImpact</a>
mRID	0..1	String	(NC) inherited from: <a href="#">RemedialActionImpact</a>

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4413 Table 467 shows all association ends of QuantitativeRemedialActionImpact with other classes.

4414 **Table 467 – Association ends of ExtRemedialAction::QuantitativeRemedialActionImpact**  
4415 **with other classes**

mult from	name	mult to	type	description
0..*	SensitivityArea	0..1	<a href="#">SensitivityArea</a>	(NC) Sensitivity area which should be monitored to evaluate the threshold given by the remedial action impact on relevant equipment.
0..*	RemedialAction	0..1	<a href="#">RemedialAction</a>	(NC) inherited from: <a href="#">RemedialActionImpact</a>
0..*	AssessingSystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">RemedialActionImpact</a>
0..1	OwnerRemedialActionAssessment	0..*	<a href="#">OwnerRemedialActionAssessment</a>	(NC) inherited from: <a href="#">RemedialActionImpact</a>

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4417 **3.15.19 (NC) RedispatchScheduleAction**4418 Inheritance path = [PowerScheduleAction](#) : IdentifiedObject : ExtEulIdentifiedObject

4419 Redispatch schedule action is an action to rearrange power schedules for a scheduled resource to obtain a feasible and secure operational state of the power electricity system.

4420 Table 468 shows all attributes of RedispatchScheduleAction.

4422 **Table 468 – Attributes of ExtRemedialAction::RedispatchScheduleAction**

name	mult	type	description
currency	0..1	Currency	(NC) inherited from: <a href="#">PowerScheduleAction</a>
energyPrice	0..1	Decimal	(NC) inherited from: <a href="#">PowerScheduleAction</a>
available	0..1	Boolean	(NC) inherited from: <a href="#">PowerScheduleAction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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4424 Table 469 shows all association ends of RedispatchScheduleAction with other classes.

4425 **Table 469 – Association ends of ExtRemedialAction::RedispatchScheduleAction with**  
4426 **other classes**

mult from	name	mult to	type	description
0..*	ScheduleResource	0..1	<a href="#">ScheduleResource</a>	(NC) The schedule resource that has this redispatch action.

mult from	name	mult to	type	description
0..*	RedispatchRemedialAction	0..1	<a href="#">RedispatchRemedialAction</a>	(NC) Redispatch remedial action that is supported by the redispatch schedule action.
0..*	RemedialActionSchedule	0..1	<a href="#">RemedialActionSchedule</a>	(NC) inherited from: <a href="#">PowerScheduleAction</a>
0..1	PowerBidSchedule	0..1	<a href="#">PowerBidSchedule</a>	(NC) inherited from: <a href="#">PowerScheduleAction</a>
0..1	PowerSchedule	0..1	<a href="#">PowerSchedule</a>	(NC) inherited from: <a href="#">PowerScheduleAction</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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4428 **3.15.20 (NC) RedispatchRemedialAction**4429 Inheritance path = [PowerRemedialAction](#) : [RemedialAction](#) : IdentifiedObject :  
4430 ExtEulIdentifiedObject4431 Redispatch remedial action is a remedial action that through rearranging power schedules is  
4432 eliminating breaches of constraints.

4433 Table 470 shows all attributes of RedispatchRemedialAction.

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**Table 470 – Attributes of ExtRemedialAction::RedispatchRemedialAction**

name	mult	type	description
maxRegulatingDown	0..1	ActivePower	(NC) inherited from: <a href="#">PowerRemedialAction</a>
maxRegulatingUp	0..1	ActivePower	(NC) inherited from: <a href="#">PowerRemedialAction</a>
available	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
kind	0..1	<a href="#">RemedialActionKind</a>	(NC) inherited from: <a href="#">RemedialAction</a>
penaltyFactor	0..1	Float	(NC) inherited from: <a href="#">RemedialAction</a>
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
isManual	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
timeToImplement	0..1	Duration	(NC) inherited from: <a href="#">RemedialAction</a>
normalAvailable	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
impactThresholdMargin	0..1	PerCent	(NC) inherited from: <a href="#">RemedialAction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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4436 Table 471 shows all association ends of RedispatchRemedialAction with other classes.

4437  
4438**Table 471 – Association ends of ExtRemedialAction::RedispatchRemedialAction with other classes**

mult from	name	mult to	type	description
0..1	RedispatchScheduleAction	0..*	<a href="#">RedispatchScheduleAction</a>	(NC) Redispatch schedule action which belongs to the redispatch remedial action.
0..*	BiddingZone	0..1	<a href="#">BiddingZone</a>	(NC) inherited from: <a href="#">PowerRemedialAction</a>
0..*	BiddingZoneBorder	0..1	<a href="#">BiddingZoneBorder</a>	(NC) inherited from: <a href="#">PowerRemedialAction</a>
0..1	PowerShiftKeyStrategy	0..*	<a href="#">PowerShiftKeyStrategy</a>	(NC) inherited from: <a href="#">PowerRemedialAction</a>
0..1	PowerBidSchedule	0..*	<a href="#">PowerBidSchedule</a>	(NC) inherited from: <a href="#">PowerRemedialAction</a>
0..1	PowerRemedialActionSchedule	0..*	<a href="#">PowerRemedialActionSchedule</a>	(NC) inherited from: <a href="#">PowerRemedialAction</a>
0..1	PowerSchedule	0..*	<a href="#">PowerSchedule</a>	(NC) inherited from: <a href="#">PowerRemedialAction</a>
0..1	ContingencyWithRemedialAction	0..*	<a href="#">ContingencyWithRemedialAction</a>	(NC) inherited from: <a href="#">RemedialAction</a>
1..1	RemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	DependentRemedialAction	0..*	<a href="#">RemedialActionDependency</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	GenericAvailableSchedule	0..*	<a href="#">GenericAvailableSchedule</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	ImpactedOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	AppointedToOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	AppointedToRegion	0..1	<a href="#">Region</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	AssessedElementWithRemedialAction	0..*	<a href="#">AssessedElementWithRemedialAction</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	RemedialActionOutcomeValue	0..*	<a href="#">RemedialActionOutcomeValue</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	RemedialActionSystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	RemedialActionImpact	0..*	<a href="#">RemedialActionImpact</a>	(NC) inherited from: <a href="#">RemedialAction</a>
1..1	RemedialActionApplied	0..*	<a href="#">RemedialActionApplied</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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4440 **3.15.21 (NC) RegulatingControlAction**4441 Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEuIdentifiedObject

4442 Control action means the set point change of a regulating control power system resource in the  
4443 grid model compared to the base case.  
4444 Table 472 shows all attributes of RegulatingControlAction.

4445 **Table 472 – Attributes of ExtRemedialAction::RegulatingControlAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4446  
4447 Table 473 shows all association ends of RegulatingControlAction with other classes.

4448 **Table 473 – Association ends of ExtRemedialAction::RegulatingControlAction with**  
4449 **other classes**

mult from	name	mult to	type	description
0..*	RegulatingControl	1..1	RegulatingControl	(NC) The regulating control which has an action.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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4451 **3.15.22 (NC) RemedialAction**  
4452 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

- 4453 Remedial action describes one or more actions that can be performed on a given power system  
4454 model situation to eliminate one or more identified breaches of constraints. The remedial action  
4455 can be costly, and have a cost characteristic, or non costly.  
4456 Table 474 shows all attributes of RemedialAction.

4457

**Table 474 – Attributes of ExtRemedialAction::RemedialAction**

name	mult	type	description
available	0..1	Boolean	(NC) Identifies if the remedial action is available to be proposed. True means available, False means unavailable.
kind	0..1	<a href="#">RemedialActionKind</a>	(NC) The kind of the remedial action. If curative remedial action, it is required to have an association with ContingencyWithRemedialAction. If preventive remedial action, RemedialAction class shall not have association with ContingencyWithRemedialAction.
penaltyFactor	0..1	Float	(NC) Defines the relative penalty for a given remedial action. This is a positive number greater than zero and default is one, meaning the remedial action does not have negative nor positive effect on the quality of the solution. A remedial action that provide changes in the transmission loss can have negative (Between zero and one) or positive effect (Bigger than one) given by $1 / (1 - \text{Incremental Transmission Loss})$ . In a similar way remedial action using generating units or compensation units can have negative or positive effect. Typical value would be between 0.8 and 1.1.
isCrossBorderRelevant	0..1	Boolean	(NC) Indicates if the remedial action is cross border relevant. True, means that the remedial action is cross border relevant.
isManual	0..1	Boolean	(NC) Indicates if the remedial action is manually executed which involves one or many actions performed by human. A SIPS remedial action cannot be manual. True, means that the remedial action is manual. False, means that the remedial action is automatically executed without human communication.
timeToImplement	0..1	Duration	(NC) Time to implement a remedial action.
normalAvailable	0..1	Boolean	(NC) It identifies if the remedial action is available under normal condition. True means available, False means unavailable.
impactThresholdMargin	0..1	PerCent	(NC) Impact threshold margin for the use of the remedial action. Meaning that the remedial action should not be used if it cannot resolve violation with more than the given impact threshold margin. The allowed value range is [0,100].
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 475 shows all association ends of RemedialAction with other classes.

4460 **Table 475 – Association ends of ExtRemedialAction::RemedialAction with other classes**

mult from	name	mult to	type	description
0..1	ContingencyWithRemedialAction	0..*	<a href="#">ContingencyWithRemedialAction</a>	(NC) The contingency and remedial action combination.
1..1	RemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) The remedial action schedule associated with a remedial action, i.e. the assigning a schedule to a remedial action.
0..1	DependentRemedialAction	0..*	<a href="#">RemedialActionDependency</a>	(NC) Remedial action dependent on a remedial action.
0..1	GenericAvailableSchedule	0..*	<a href="#">GenericAvailableSchedule</a>	(NC) Available schedule associated to a remedial action.
0..*	ImpactedOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) The impacted overlapping zone for this impacting remedial action.
0..*	AppointedToOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) The overlapping zone appointed to the remedial action.
0..*	AppointedToRegion	0..1	<a href="#">Region</a>	(NC) The region in which the remedial action is appointed.
0..1	AssessedElementWithRemedialAction	0..*	<a href="#">AssessedElementWithRemedialAction</a>	(NC) The assessed element and remedial action combination to be simulated for this remedial action.
0..1	RemedialActionOutcomeValue	0..*	<a href="#">RemedialActionOutcomeValue</a>	(NC) The remedial action outcome value associated with a remedial action.
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) The controllable quantity for a remedial action.
0..*	RemedialActionSystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) System operator operating remedial actions.
0..1	RemedialActionImpact	0..*	<a href="#">RemedialActionImpact</a>	(NC) This is the impact for a given remedial action.
1..1	RemedialActionApplied	0..*	<a href="#">RemedialActionApplied</a>	(NC) The relationship of the applied remedial action and power flow result.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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4462 **3.15.23 (NC) RemedialActionCost root class**

4463 Remedial action cost is the total cost itemised cost by category and type for the remedial action.  
4464 Table 476 shows all attributes of RemedialActionCost.

4465 **Table 476 – Attributes of ExtRemedialAction::RemedialActionCost**

name	mult	type	description
costAllocationTime	0..1	DateTime	(NC) Cost allocation time is the time the cost shall be allocated.
kind	0..1	<a href="#">CostSettledKind</a>	(NC) Remedial action cost category related to the confirmation of the cost in regards to changes.

name	mult	type	description
operationalCost	0..1	Decimal	(NC) Operational cost is the total cost directly related to operate the unit according to the remedial action, e.g. fuel cost.
opportunityCost	0..1	Decimal	(NC) Opportunity cost is the total cost of potential earning that is missed due to performing the remedial action.
otherCost	0..1	Decimal	(NC) Other cost is the total cost that cannot be directly allocated to any of the other items.
processingFee	0..1	Decimal	(NC) Processing fee is the total cost for processing the remedial action.
savedFuelCost	0..1	Decimal	(NC) Saved fuel cost is the total saving due to not consuming the expected fuel as part of the remedial action.
shutdownCost	0..1	Decimal	(NC) Shutdown cost is the total cost for shutting down a unit as part of the remedial action.
startupCost	0..1	Decimal	(NC) Start-up cost is the total cost for activating the remedial action, e.g. if a generator needs to be started before it can perform the remedial action.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4466

4467

Table 477 shows all association ends of RemedialActionCost with other classes.

4468

**Table 477 – Association ends of ExtRemedialAction::RemedialActionCost with other classes**

4469

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	<a href="#">RemedialActionSchedule</a>	(NC) Remedial action schedule for which this remedial action cost relates to.

4470

### 4471 3.15.24 (NC) RemedialActionImpact root class

4472 Remedial action impact assessment based on a given agreement with a specific system operator.

4473

4474 Table 478 shows all attributes of RemedialActionImpact.

4475

**Table 478 – Attributes of ExtRemedialAction::RemedialActionImpact**

name	mult	type	description
impactQuantity	0..1	Float	(NC) Delta, positive or negative, quantity that when it is applied to the remedial action, it will cause impact on a conducting equipment monitored by the assessed system operator.  Example of relevant remedial action changes are redispatching, countertrading, change of set point on HVDC systems or change of taps on phase-shifting transformers.
kind	0..1	<a href="#">ImpactAgreementKind</a>	(NC) The impact agreement kind.

name	mult	type	description
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4476

4477

Table 479 shows all association ends of RemedialActionImpact with other classes.

4478

**Table 479 – Association ends of ExtRemedialAction::RemedialActionImpact with other classes**

4479

mult from	name	mult to	type	description
0..*	RemedialAction	0..1	<a href="#">RemedialAction</a>	(NC) The remedial action that has an impact.
0..*	AssessingSystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) The impacted System Operator that assigns a remedial action impact.
0..1	OwnerRemedialActionAssessment	0..*	<a href="#">OwnerRemedialActionAssessment</a>	(NC) The owner's assessment to the impacted system operator.

4480

4481

### 3.15.25 (NC) RemedialActionSchedule

4482

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

4483

A schedule for a determined remedial action.

4484

Table 480 shows all attributes of RemedialActionSchedule.

4485

**Table 480 – Attributes of ExtRemedialAction::RemedialActionSchedule**

name	mult	type	description
statusKind	0..1	<a href="#">RemedialActionScheduleStatusKind</a>	(NC) Indicates the status kind for the remedial action schedule.
statusReason	0..1	String	(NC) Description of reasoning for the status. For instance, in case of rejected remedial action, the reason for this rejection is described here.
totalCost	0..1	Decimal	(NC) Total cost of the remedial action.
totalCostCurrency	0..1	Currency	(NC) The currency of the total cost.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4486

4487

Table 481 shows all association ends of RemedialActionSchedule with other classes.

4488  
4489**Table 481 – Association ends of ExtRemedialAction::RemedialActionSchedule with other classes**

mult from	name	mult to	type	description
0..*	Contingency	0..1	Contingency	(NC) The contingency for a curative remedial action schedule.
0..1	EventSchedule	0..1	<a href="#">EventSchedule</a>	Event schedule that describes the validity of the remedial action schedule.
0..*	ProposingEntity	0..1	<a href="#">SecurityCoordinator</a>	(NC) The security coordinator that is proposing this remedial action schedule.
0..1	ProposingRemedialActionScheduleShare	0..*	<a href="#">ProposingRemedialActionScheduleShare</a>	(NC) The entity with its associated share that are making the proposal of the remedial action schedule
0..*	OverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) The overlapping zone for this overlapping remedial action schedule.
0..*	AssignedRegion	0..1	<a href="#">Region</a>	(NC) The assigned region for this remedial action schedule.
0..1	RemedialActionScheduleOutcomeValue	0..*	<a href="#">RemedialActionScheduleOutcomeValue</a>	(NC) The remedial action schedule outcome value associated with a remedial action schedule.
0..*	RemedialAction	1..1	<a href="#">RemedialAction</a>	(NC) The remedial action that has a remedial action schedule associated.
0..1	RemedialActionCost	0..*	<a href="#">RemedialActionCost</a>	(NC) Remedial action cost related to this remedial schedule.
0..1	RemedialActionScheduleAcceptance	0..*	<a href="#">RemedialActionScheduleAcceptance</a>	(NC) The remedial action schedule acceptance related to a remedial action schedule.
0..1	GenericValueSchedule	0..*	<a href="#">GenericValueSchedule</a>	(NC) Generic value schedule which belongs to a remedial action schedule.
0..1	PowerScheduleAction	0..*	<a href="#">PowerScheduleAction</a>	(NC) Power schedule action which belongs to a remedial action schedule.
0..1	ProposedDependency	0..*	<a href="#">RemedialActionScheduleDependency</a>	(NC) Dependency for the proposed remedial action schedule.
0..1	ReplacedDependency	0..*	<a href="#">RemedialActionScheduleDependency</a>	(NC) Replaced dependency for this remedial action schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4490

**4491 3.15.26 (NC) RemedialActionScheduleAcceptance root class**

4492 It identifies if the remedial action schedule is accepted for a given system operator.

4493 Table 482 shows all attributes of RemedialActionScheduleAcceptance.

**4494 Table 482 – Attributes of ExtRemedialAction::RemedialActionScheduleAcceptance**

name	mult	type	description
kind	0..1	<a href="#">RemedialActionScheduleAcceptanceKind</a>	(NC) The kind of the remedial action acceptance.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an

name	mult	type	description
			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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4495  
4496  
4497

Table 483 shows all association ends of RemedialActionScheduleAcceptance with other classes.

**Table 483 – Association ends of ExtRemedialAction::RemedialActionScheduleAcceptance with other classes**

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	<a href="#">RemedialActionSchedule</a>	(NC) A remedial action schedule for which a remedial action schedule acceptance is reported.
0..*	RespondingEntity	0..1	<a href="#">SystemOperator</a>	(NC) An entity for which a remedial action schedule acceptances are reported.

4500

### 4501 3.15.27 (NC) RotatingMachineAction

4502 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :

4503 ExtEulIdentifiedObject

4504 Rotating machine action.

4505 Table 484 shows all attributes of RotatingMachineAction.

4506

**Table 484 – Attributes of ExtRemedialAction::RotatingMachineAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4507

4508 Table 485 shows all association ends of RotatingMachineAction with other classes.

4509 **Table 485 – Association ends of ExtRemedialAction::RotatingMachineAction with other**  
4510 **classes**

mult from	name	mult to	type	description
0..*	RotatingMachine	1..1	RotatingMachine	(NC) The rotating machine that has an action.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4511

4512 **3.15.28 (NC) SetPointAction**4513 Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject

4514 Setpoint action.

4515 Table 486 shows all attributes of SetPointAction.

4516 **Table 486 – Attributes of ExtRemedialAction::SetPointAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4517

4518 Table 487 shows all association ends of SetPointAction with other classes.

4519 **Table 487 – Association ends of ExtRemedialAction::SetPointAction with other classes**

mult from	name	mult to	type	description
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4520

4521 **3.15.29 (NC) SchemeRemedialAction**4522 Inheritance path = [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject

4523 Scheme remedial action is remedial action that involves a scheme that can include conditional  
 4524 logic and stages of grid alteration. The primary remedial action is the arming of these schemes,  
 4525 that will then perform curative remedial action when the condition is met. System Integrity  
 4526 Protection Scheme (SIPS) and Special Protection Scheme (SPS) are example of this.  
 4527 Table 488 shows all attributes of SchemeRemedialAction.

4528 **Table 488 – Attributes of ExtRemedialAction::SchemeRemedialAction**

name	mult	type	description
available	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
kind	0..1	<a href="#">RemedialActionKind</a>	(NC) inherited from: <a href="#">RemedialAction</a>
penaltyFactor	0..1	Float	(NC) inherited from: <a href="#">RemedialAction</a>
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
isManual	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
timeToImplement	0..1	Duration	(NC) inherited from: <a href="#">RemedialAction</a>
normalAvailable	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
impactThresholdMargin	0..1	PerCent	(NC) inherited from: <a href="#">RemedialAction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4529

4530 Table 489 shows all association ends of SchemeRemedialAction with other classes.

4531 **Table 489 – Association ends of ExtRemedialAction::SchemeRemedialAction with other**  
4532 **classes**

mult from	name	mult to	type	description
0..1	RemedialActionScheme	0..1	<a href="#">RemedialActionScheme</a>	(NC) Remedial action scheme for this scheme remedial action.
0..1	RemedialActionSchemeSchedule	0..*	<a href="#">RemedialActionSchemeSchedule</a>	(NC) Remedial action scheme schedule associated with a remedial action scheme.
0..1	ContingencyWithRemedialAction	0..*	<a href="#">ContingencyWithRemedialAction</a>	(NC) inherited from: <a href="#">RemedialAction</a>
1..1	RemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	DependentRemedialAction	0..*	<a href="#">RemedialActionDependency</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	GenericAvailableSchedule	0..*	<a href="#">GenericAvailableSchedule</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	ImpactedOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	AppointedToOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	AppointedToRegion	0..1	<a href="#">Region</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	AssessedElementWithRemedialAction	0..*	<a href="#">AssessedElementWithRemedialAction</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	RemedialActionOutcomeValue	0..*	<a href="#">RemedialActionOutcomeValue</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	RemedialActionSystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	RemedialActionImpact	0..*	<a href="#">RemedialActionImpact</a>	(NC) inherited from: <a href="#">RemedialAction</a>
1..1	RemedialActionApplied	0..*	<a href="#">RemedialActionApplied</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4533

4534 **3.15.30 (NC) ShuntCompensatorModification**

4535 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :

4536 ExtEulIdentifiedObject

4537 Shunt compensator action.

4538 Table 490 shows all attributes of ShuntCompensatorModification.

4539 **Table 490 – Attributes of ExtRemedialAction::ShuntCompensatorModification**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>

name	mult	type	description
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4540

4541 Table 491 shows all association ends of ShuntCompensatorModification with other classes.

4542 **Table 491 – Association ends of ExtRemedialAction::ShuntCompensatorModification**  
4543 **with other classes**

mult from	name	mult to	type	description
0..*	ShuntCompensator	1..1	ShuntCompensator	(NC) The ShuntCompensator that is associated with an action.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4544

4545 **3.15.31 (NC) StaticPropertyRange**4546 Inheritance path = [RangeConstraint](#) : IdentifiedObject : ExtEulIdentifiedObject4547 Defines the static range, which means that this is the minimum and/or maximum of an attribute  
4548 value. The value provided by the schedule replaces the value of the attribute to which the  
4549 schedule refers to.4550 In case that the PropertyReference refers to Boolean type attributes, RangeConstraint.direction  
4551 shall be none or upAndDown and the RangeConstraint.valueKind shall be absolute. If the  
4552 direction is none then optimization of the attribute referenced by the PropertyReference is not  
4553 possible if the current status is already as the value in the range. Otherwise if the direction is

4554 upAndDown, the optimization can change from true to false or vice versa independently of the  
4555 initial value in the operational scenario.  
4556 For instance for a tap changer related grid state alteration for a particular point in time, if the  
4557 range of TapChanger.step is to be restricted, the value of the schedule will represent that new  
4558 TapChanger.step range.  
4559 Table 492 shows all attributes of StaticPropertyRange.

4560 **Table 492 – Attributes of ExtRemedialAction::StaticPropertyRange**

name	mult	type	description
valueKind	0..1	<a href="#">ValueOffsetKind</a>	(NC) inherited from: <a href="#">RangeConstraint</a>
direction	0..1	<a href="#">RelativeDirectionKind</a>	(NC) inherited from: <a href="#">RangeConstraint</a>
value	0..1	Float	(NC) inherited from: <a href="#">RangeConstraint</a>
normalValue	0..1	Float	(NC) inherited from: <a href="#">RangeConstraint</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4561  
4562 Table 493 shows all association ends of StaticPropertyRange with other classes.

4563 **Table 493 – Association ends of ExtRemedialAction::StaticPropertyRange with other**  
4564 **classes**

mult from	name	mult to	type	description
0..*	PropertyReference	1..1	<a href="#">PropertyReference</a>	Property reference for this static property range.
0..*	GridStateAlteration	0..1	<a href="#">GridStateAlteration</a>	(NC) inherited from: <a href="#">RangeConstraint</a>
0..1	GenericValueSchedule	0..*	<a href="#">GenericValueSchedule</a>	(NC) inherited from: <a href="#">RangeConstraint</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4565  
4566 **3.15.32 (NC) StaticVarCompensatorAction**

4567 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :  
4568 ExtEulIdentifiedObject  
4569 Static Var compensator action.  
4570 Table 494 shows all attributes of StaticVarCompensatorAction.

4571 **Table 494 – Attributes of ExtRemedialAction::StaticVarCompensatorAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>

name	mult	type	description
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4572

4573

Table 495 shows all association ends of StaticVarCompensatorAction with other classes.

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**Table 495 – Association ends of ExtRemedialAction::StaticVarCompensatorAction with other classes**

mult from	name	mult to	type	description
0..*	StaticVarCompensator	1..1	StaticVarCompensator	(NC) The StaticVarCompensator which is associated with an action.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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### 3.15.33 (NC) TapPositionAction

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Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject

4579

Tap position action represents a change of a tap changer position in the grid model compared to the base case.

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Table 496 shows all attributes of TapPositionAction.

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**Table 496 – Attributes of ExtRemedialAction::TapPositionAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>

name	mult	type	description
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 497 shows all association ends of TapPositionAction with other classes.

**Table 497 – Association ends of ExtRemedialAction::TapPositionAction with other classes**

mult from	name	mult to	type	description
0..*	TapChanger	1..1	TapChanger	(NC) The tap changer that has a tap position action associated.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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**3.15.34 (NC) TopologyAction**

Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject

Topology action means the connection or disconnection of a switch in the grid model compared to the base case.

Table 498 shows all attributes of TopologyAction.

**Table 498 – Attributes of ExtRemedialAction::TopologyAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>

name	mult	type	description
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 499 shows all association ends of TopologyAction with other classes.

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#### Table 499 – Association ends of ExtRemedialAction::TopologyAction with other classes

mult from	name	mult to	type	description
0..*	Switch	1..1	Switch	(NC) The switch that has a topology action associated.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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#### 3.15.35 (NC) CostSettledKind enumeration

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Kind describing how settled the cost is in regards to changes.

4600

Table 500 shows all literals of CostSettledKind.

4601

#### Table 500 – Literals of ExtRemedialAction::CostSettledKind

literal	value	description
indicative		Indicative cost.
provisional		Provisional cost.

literal	value	description
final		Final cost. For instance, the cost is not expected to be changed on a later stage.

4602

4603 **3.15.36 (NC) ImpactAgreementKind enumeration**

4604 The impact agreement for the remedial action.

4605 Table 501 shows all literals of ImpactAgreementKind.

4606

**Table 501 – Literals of ExtRemedialAction::ImpactAgreementKind**

literal	value	description
noAgreement		No agreement is reached on the qualitative impact of a remedial action.
never		An agreement is reached that a remedial action is never impacting.
always		An agreement is reached that the remedial action is always impacting whichever the intensity.

4607

4608 **3.15.37 (NC) BidDirectionKind enumeration**

4609 Kind of direction of the bid.

4610 Table 502 shows all literals of BidDirectionKind.

4611

**Table 502 – Literals of ExtRemedialAction::BidDirectionKind**

literal	value	description
up		Up signifies that the available power can be used by the purchasing area to increase energy.
down		Down signifies that the available power can be used by the purchasing area to decrease energy.
upAndDown		Up and down signifies that both up and down values are equal.
stable		The direction at a given instant in time is considered to be stable.

4612

4613 **3.15.38 (NC) RelativeDirectionKind enumeration**

4614 Kind of direction for the changes.

4615 Table 503 shows all literals of RelativeDirectionKind.

4616

**Table 503 – Literals of ExtRemedialAction::RelativeDirectionKind**

literal	value	description
up		Up signifies that the changes are increasing from the current status.
down		Down signifies that the changes are decreasing from the current status.
upAndDown		Up and down signifies that both up and down values are equal.
none		There is no direction on the changes.

4617

4618 **3.15.39 (NC) RemedialActionScheduleAcceptanceKind enumeration**

4619 The kind of acceptance for a remedial action schedule.

4620 Table 504 shows all literals of RemedialActionScheduleAcceptanceKind.

4621 **Table 504 – Literals of ExtRemedialAction::RemedialActionScheduleAcceptanceKind**

literal	value	description
accepted		The acceptance of remedial action schedule is concluded and accepted.
refused		The acceptance of the remedial action schedule is concluded and refused.
waiting		The acceptance of the remedial action schedule is waiting (in progress).
timeout		The acceptance of the remedial action schedule was not completed due to timeout.

4622

4623 **3.15.40 (NC) RemedialActionKind enumeration**

4624 The different kinds for a remedial action.

4625 Table 505 shows all literals of RemedialActionKind.

4626 **Table 505 – Literals of ExtRemedialAction::RemedialActionKind**

literal	value	description
curative		Curative remedial action means a remedial action that is the result of an operational planning process and is activated straight subsequent to the occurrence of the respective contingency for compliance with the (N-1) criterion, taking into account transitory admissible overloads and their accepted duration.
preventive		Preventive remedial action means a remedial action that is the result of an operational planning process and needs to be activated prior to the investigated timeframe for compliance with the (N-1) criterion.

4627

4628 **3.15.41 (NC) RemedialActionScheduleStatusKind enumeration**

4629 Remedial action schedule status kinds.

4630 Table 506 shows all literals of RemedialActionScheduleStatusKind.

4631 **Table 506 – Literals of ExtRemedialAction::RemedialActionScheduleStatusKind**

literal	value	description
proposed		Proposed remedial action schedule.
agreed		Agreed remedial action schedule.
rejected		Rejected remedial action schedule.
ordered		Ordered remedial action schedule.
previouslyAgreed		Previously agreed remedial action schedule.
notUsed		Not used remedial action schedule.
agreementValidated		The agreement is validated for the remedial action schedule.
rejectionValidated		The rejection is validated for the remedial action schedule.
implemented		An ordered remedial action is implemented.
activated		Activated remedial action schedule.

4632

4633 **3.15.42 (NC) ValueOffsetKind enumeration**

4634 The kind of the value offset.

4635 Table 507 shows all literals of ValueOffsetKind.

4636 **Table 507 – Literals of ExtRemedialAction::ValueOffsetKind**

literal	value	description
absolute		Value of the range constraint is replacing the attribute value referenced by the PropertyReference in a determined operational scenario.
incremental		Value of the range constraint is incrementing the attribute value referenced by the PropertyReference in a determined operational scenario.
incrementalPercentage		Value of the range constraint is incrementing in percentage the attribute value referenced by the PropertyReference in a determined operational scenario.

4637

4638 **3.15.43 (NC) RemedialActionDependency root class**

4639 Remedial action dependency is making two remedial actions depending on each other. Multiple  
4640 dependency is done by multiple instances of this class. The dependency can arrive by having  
4641 one of the following examples.

4642 - The dependent remedial action is controlled by different system operator (Modeling Authority)  
4643 (e.g. SIPS that goes across control area).

4644 - The dependent remedial action is representing two or more remedial action that represent  
4645 the same grid state alteration but with different modeling resolution (e.g. detail direct current  
4646 model versus a simplified model).

4647 - The remedial action can be combined with other remedial action without the need to create  
4648 multiple remedial action with the same grid alteration for enabling dependency.

4649 Table 508 shows all attributes of RemedialActionDependency.

4650 **Table 508 – Attributes of ExtRemedialAction::RemedialActionDependency**

name	mult	type	description
kind	0..1	<a href="#">RemedialActionDepende ncyKind</a>	(NC) Type of dependency between two remedial actions.
enabled	0..1	Boolean	(NC) If true, the remedial action dependency is enabled, otherwise it is disabled.
normalEnabled	0..1	Boolean	(NC) If true, the remedial action dependency with contingency shall be considered under normal operating conditions.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4651

4652 Table 509 shows all association ends of RemedialActionDependency with other classes.

4653 **Table 509 – Association ends of ExtRemedialAction::RemedialActionDependency with**  
4654 **other classes**

mult from	name	mult to	type	description
0..*	DependingRemedialActionGroup	0..1	<a href="#">RemedialActionGroup</a>	(NC) Remedial action group which the remedial action is depending on.
0..1	GenericEnablingSchedule	0..*	<a href="#">GenericEnablingSchedule</a>	(NC) Enabling schedule associated to a remedial action dependency.
0..*	RemedialAction	0..1	<a href="#">RemedialAction</a>	(NC) Remedial action which has dependent remedial actions.

4655

### 4656 3.15.44 (NC) BiddingZoneAction

4657 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :  
4658 ExtEulIdentifiedObject

4659 Bidding zone set point action.

4660 Table 510 shows all attributes of BiddingZoneAction.

4661 **Table 510 – Attributes of ExtRemedialAction::BiddingZoneAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4662

4663 Table 511 shows all association ends of BiddingZoneAction with other classes.

4664 **Table 511 – Association ends of ExtRemedialAction::BiddingZoneAction with other**  
4665 **classes**

mult from	name	mult to	type	description
0..*	BiddingZone	1..1	<a href="#">BiddingZone</a>	(NC) The bidding zone that has this bidding zone action.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>

mult from	name	mult to	type	description
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4666

4667 **3.15.45 (NC) RemedialActionScheduleGroup**

4668 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

4669 Remedial action schedule group collects two or more remedial action schedules together. The remedial action schedule group needs to be set up for the same remedial action or proposing alternative remedial action by including a reference to another remedial action.

4670 Table 512 shows all attributes of RemedialActionScheduleGroup.

4673 **Table 512 – Attributes of ExtRemedialAction::RemedialActionScheduleGroup**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4674

4675 Table 513 shows all association ends of RemedialActionScheduleGroup with other classes.

4676 **Table 513 – Association ends of ExtRemedialAction::RemedialActionScheduleGroup with other classes**

4677

mult from	name	mult to	type	description
0..1	GroupDependency	0..*	<a href="#">RemedialActionScheduleDependency</a>	(NC) Group dependency for this remedial action schedule group.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4678

4679 **3.15.46 (NC) RangeConstraint**

4680 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

4681 Defines the range constraint.

4682 Table 514 shows all attributes of RangeConstraint.

4683

**Table 514 – Attributes of ExtRemedialAction::RangeConstraint**

name	mult	type	description
valueKind	0..1	<a href="#">ValueOffsetKind</a>	(NC) Kind of value offset for the range that applies to the attribute referenced by the PropertyReference.
direction	0..1	<a href="#">RelativeDirectionKind</a>	(NC) Defines the direction of the attribute value referenced by the PropertyReference.
value	0..1	Float	(NC) The value at the time. The meaning of the value is defined by the attribute referenced by the PropertyReference. The value can be integer, float or boolean. In case of boolean 1 equals true and 0 equals false. If the valueKind is incremental or incrementalPercentage, then the value shall be positive (greater than zero). If the valueKind is incrementalPercentage, then the value shall be in the range [0, 100].
normalValue	0..1	Float	(NC) The normal (initial) value. The meaning of the value is defined by the attribute referenced by the PropertyReference. The value can be integer, float or boolean. In case of boolean 1 equals true and 0 equals false. If the valueKind is incremental or incrementalPercentage, then the value shall be positive (greater than zero). If the valueKind is incrementalPercentage, then the value shall be in the range [0, 100].
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4684

4685

Table 515 shows all association ends of RangeConstraint with other classes.

4686

**Table 515 – Association ends of ExtRemedialAction::RangeConstraint with other classes**

4687

mult from	name	mult to	type	description
0..*	GridStateAlteration	0..1	<a href="#">GridStateAlteration</a>	(NC) The grid state alteration which has static range.
0..1	GenericValueSchedule	0..*	<a href="#">GenericValueSchedule</a>	(NC) Generic value schedule which has a range constraint.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4688

4689 **3.15.47 (NC) ProposingRemedialActionScheduleShare root class**

4690 Proposing entity (System Operator) with a proper cost share for a given remedial action schedule.

4691 Table 516 shows all attributes of ProposingRemedialActionScheduleShare.

4692 **Table 516 – Attributes of ExtRemedialAction::ProposingRemedialActionScheduleShare**

name	mult	type	description
costSharingFactor	0..1	Decimal	(NC) Sharing factor of the cost of the remedial action as a fraction of the total cost, i.e. system operator's cost = cost x (costSharingFactor / sum of all costSharingFactor).
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4694

4695 Table 517 shows all association ends of ProposingRemedialActionScheduleShare with other classes.

4696

4697 **Table 517 – Association ends of**4698 **ExtRemedialAction::ProposingRemedialActionScheduleShare with other classes**

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	<a href="#">RemedialActionSchedule</a>	(NC) Remedial action schedule proposed by the proposing entity.
0..*	ProposingEntity	0..1	<a href="#">SystemOperator</a>	(NC) Proposing entity making the proposing remedial action schedule share.

4699

4700 **3.15.48 (NC) RemedialActionDependencyKind enumeration**

4701 Kind of dependency between remedial actions.

4702 Table 518 shows all literals of RemedialActionDependencyKind.

4703 **Table 518 – Literals of ExtRemedialAction::RemedialActionDependencyKind**

literal	value	description
exclusive		Remedial actions are exclusive depending on each other. e.g. Only one of the remedial actions can be selected at the same time.
inclusive		Remedial actions are inclusive depending on each other. e.g. Both remedial actions need to be picked if one of them is needed.
restrictive		Remedial actions are restrictive depending on each other. The need to include or to exclude might depend on the model. e.g. In the case of simplified DC model and detailed DC model. In the case where the simplified remedial action is used but not the remedial action for the detail model and opposite for the DC model.

literal	value	description
none		Remedial actions are not depending on each other. However, the two remedial actions should be evaluated together.
balanced		This applies only to a set of power remedial actions and means that the remedial action needs to be balanced between the area (directly or indirectly to the bidding zone) that it is applied to.

4704

4705 **3.15.49 (NC) ShiftMethodKind enumeration**4706 Kind of shift method. Describes the way a power schedule should be distributed amongst  
4707 production and consumption. e.g. Type of generating and load shift key.

4708 Table 519 shows all literals of ShiftMethodKind.

4709

**Table 519 – Literals of ExtRemedialAction::ShiftMethodKind**

literal	value	description
shared		Power schedule shift (distribution) is done by a shared fraction e.g. A two unit with the participation factor 60 and 40 will distribute a 10 MW schedule by 6 and 4 MW.
priority		Power schedule shift (distribution) is done by a shared fraction prioritizing the unit e.g. A two unit with the participation factor 60 and 40 will distribute a 10 MW increased schedule by first filling the highest participation factor (priority) until max economy power or maximum power allowed by the unit before it starts filling the next on the list. e.g. The unit with 60 will be getting its maximum shared first. The same logic applies with reducing the schedule. e.g. The 60 participation factor unit will be reduced to its min economy factor or minimum power.

4710

4711 **3.15.50 (NC) CountertradeScheduleAction**4712 Inheritance path = [PowerScheduleAction](#) : IdentifiedObject : ExtEulIdentifiedObject4713 Countertrade schedule action is an action to rearrange power schedules based on a Generation  
4714 and Load Shift Key (GLSK) strategy.

4715 Table 520 shows all attributes of CountertradeScheduleAction.

4716

**Table 520 – Attributes of ExtRemedialAction::CountertradeScheduleAction**

name	mult	type	description
currency	0..1	Currency	(NC) inherited from: <a href="#">PowerScheduleAction</a>
energyPrice	0..1	Decimal	(NC) inherited from: <a href="#">PowerScheduleAction</a>
available	0..1	Boolean	(NC) inherited from: <a href="#">PowerScheduleAction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4717

4718 Table 521 shows all association ends of CountertradeScheduleAction with other classes.

4719 **Table 521 – Association ends of ExtRemedialAction::CountertradeScheduleAction with**  
4720 **other classes**

mult from	name	mult to	type	description
0..*	CountertradeRemedialAction	0..1	<a href="#">CountertradeRemedialAction</a>	(NC) Countertrade remedial action which has associated countertrade schedule actions.
0..*	RemedialActionSchedule	0..1	<a href="#">RemedialActionSchedule</a>	(NC) inherited from: <a href="#">PowerScheduleAction</a>
0..1	PowerBidSchedule	0..1	<a href="#">PowerBidSchedule</a>	(NC) inherited from: <a href="#">PowerScheduleAction</a>
0..1	PowerSchedule	0..1	<a href="#">PowerSchedule</a>	(NC) inherited from: <a href="#">PowerScheduleAction</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4721

### 4722 3.15.51 (NC) PowerScheduleAction

4723 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

4724 Power schedule action is an action to rearrange power schedules.

4725 Table 522 shows all attributes of PowerScheduleAction.

4726 **Table 522 – Attributes of ExtRemedialAction::PowerScheduleAction**

name	mult	type	description
currency	0..1	Currency	(NC) Currency the energy price is given in.
energyPrice	0..1	Decimal	(NC) Energy price for the power schedule action.
available	0..1	Boolean	(NC) Defines if the power schedule action is available and can be used. If true, the reserve action is available and can be used. If false, the reserve action is defined, but not available to be used.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4727

4728 Table 523 shows all association ends of PowerScheduleAction with other classes.

4729 **Table 523 – Association ends of ExtRemedialAction::PowerScheduleAction with other**  
4730 **classes**

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	<a href="#">RemedialActionSchedule</a>	(NC) Remedial action schedule which power schedule actions.

mult from	name	mult to	type	description
0..1	PowerBidSchedule	0..1	<a href="#">PowerBidSchedule</a>	(NC) The power bid schedule which contains the power schedule action.
0..1	PowerSchedule	0..1	<a href="#">PowerSchedule</a>	(NC) Power schedule which contains the power schedule action.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4731

4732 **3.15.52 (NC) PowerRemedialAction**4733 Inheritance path = [RemedialAction](#) : IdentifiedObject : ExtEulIdentifiedObject

4734 Energy remedial action describes actions to rearrange power schedules.

4735 Table 524 shows all attributes of PowerRemedialAction.

4736

**Table 524 – Attributes of ExtRemedialAction::PowerRemedialAction**

name	mult	type	description
maxRegulatingDown	0..1	ActivePower	(NC) Maximum net amount of active power that the remedial action can regulate down.
maxRegulatingUp	0..1	ActivePower	(NC) Maximum net amount of active power that the remedial action can regulate up.
available	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
kind	0..1	<a href="#">RemedialActionKind</a>	(NC) inherited from: <a href="#">RemedialAction</a>
penaltyFactor	0..1	Float	(NC) inherited from: <a href="#">RemedialAction</a>
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
isManual	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
timeToImplement	0..1	Duration	(NC) inherited from: <a href="#">RemedialAction</a>
normalAvailable	0..1	Boolean	(NC) inherited from: <a href="#">RemedialAction</a>
impactThresholdMargin	0..1	PerCent	(NC) inherited from: <a href="#">RemedialAction</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4737

4738 Table 525 shows all association ends of PowerRemedialAction with other classes.

**Table 525 – Association ends of ExtRemedialAction::PowerRemedialAction with other classes**

mult from	name	mult to	type	description
0..*	BiddingZone	0..1	<a href="#">BiddingZone</a>	(NC) The Bidding Zone where the power remedial action is done.

4739

4740

mult from	name	mult to	type	description
0..*	BiddingZoneBorder	0..1	<a href="#">BiddingZoneBorder</a>	(NC) Bidding zone border where the power remedial action is done.
0..1	PowerShiftKeyStrategy	0..*	<a href="#">PowerShiftKeyStrategy</a>	(NC) Power Shift Key Strategy which applies to this power remedial action.
0..1	PowerBidSchedule	0..*	<a href="#">PowerBidSchedule</a>	(NC) Power bid schedule addressing the power remedial action.
0..1	PowerRemedialActionSchedule	0..*	<a href="#">PowerRemedialActionSchedule</a>	(NC) Power remedial action schedule which has a power remedial action.
0..1	PowerSchedule	0..*	<a href="#">PowerSchedule</a>	(NC) Power schedule which contains the power remedial action.
0..1	ContingencyWithRemedialAction	0..*	<a href="#">ContingencyWithRemedialAction</a>	(NC) inherited from: <a href="#">RemedialAction</a>
1..1	RemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	DependentRemedialAction	0..*	<a href="#">RemedialActionDependency</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	GenericAvailableSchedule	0..*	<a href="#">GenericAvailableSchedule</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	ImpactedOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	AppointedToOverlappingZone	0..1	<a href="#">OverlappingZone</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	AppointedToRegion	0..1	<a href="#">Region</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	AssessedElementWithRemedialAction	0..*	<a href="#">AssessedElementWithRemedialAction</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	RemedialActionOutcomeValue	0..*	<a href="#">RemedialActionOutcomeValue</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..*	RemedialActionSystemOperator	0..1	<a href="#">SystemOperator</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	RemedialActionImpact	0..*	<a href="#">RemedialActionImpact</a>	(NC) inherited from: <a href="#">RemedialAction</a>
1..1	RemedialActionApplied	0..*	<a href="#">RemedialActionApplied</a>	(NC) inherited from: <a href="#">RemedialAction</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4741

4742 **3.15.53 (NC) EquipmentControllerAction**4743 Inheritance path = [SetPointAction](#) : [GridStateAlteration](#) : IdentifiedObject :

4744 ExtEulIdentifiedObject

4745 Action for setting the equipment controller action.

4746 Table 526 shows all attributes of EquipmentControllerAction.

4747 **Table 526 – Attributes of ExtRemedialAction::EquipmentControllerAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>

name	mult	type	description
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4748

4749

Table 527 shows all association ends of EquipmentControllerAction with other classes.

4750

**Table 527 – Association ends of ExtRemedialAction::EquipmentControllerAction with other classes**

4751

mult from	name	mult to	type	description
0..*	EquipmentController	1..1	<a href="#">EquipmentController</a>	(NC) Equipment controller that has associated equipment controller actions.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4752

4753

### 3.15.54 (NC) RemedialActionGroup

4754

Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

4755

Grouping of remedial actions that can be operated together.

4756

Table 528 shows all attributes of RemedialActionGroup.

4757

**Table 528 – Attributes of ExtRemedialAction::RemedialActionGroup**

name	mult	type	description
maxRegulatingDown	0..1	ActivePower	(NC) Maximum net amount of active power that the group of remedial actions can regulate down.
maxRegulatingUp	0..1	ActivePower	(NC) Maximum net amount of active power that the group of remedial actions can regulate up.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4758

4759

Table 529 shows all association ends of RemedialActionGroup with other classes.

4760

4761

**Table 529 – Association ends of ExtRemedialAction::RemedialActionGroup with other classes**

mult from	name	mult to	type	description
0..1	RemedialAction	0..*	<a href="#">RemedialActionDependency</a>	(NC) Remedial action dependency on a remedial action group.
0..1	RemedialActionGroupSchedule	0..*	<a href="#">RemedialActionGroupSchedule</a>	(NC) Remedial action group schedule associated with a remedial action group.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4762

**3.15.55 (NC) InServiceAction**

4764 Inheritance path = [GridStateAlteration](#) : IdentifiedObject : ExtEulIdentifiedObject

4765 In service action represents a change of the status of the equipment in the grid model compared to the base case.

4767 Table 530 shows all attributes of InServiceAction.

4768

**Table 530 – Attributes of ExtRemedialAction::InServiceAction**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
normalEnabled	0..1	Boolean	(NC) inherited from: <a href="#">GridStateAlteration</a>
participationFactor	0..1	PerCent	(NC) inherited from: <a href="#">GridStateAlteration</a>
maximumPerDay	0..1	Integer	(NC) inherited from: <a href="#">GridStateAlteration</a>
minimumActivation	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
timePerStage	0..1	Duration	(NC) inherited from: <a href="#">GridStateAlteration</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

4769

4770

Table 531 shows all association ends of InServiceAction with other classes.

4771

**Table 531 – Association ends of ExtRemedialAction::InServiceAction with other classes**

mult from	name	mult to	type	description
0..*	Equipment	1..1	Equipment	(NC) Equipment that has a in service action associated.
0..1	AvailabilityEnabled	0..*	<a href="#">AvailabilityEnabled</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationCollection	0..1	<a href="#">GridStateAlterationCollection</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	PropertyReference	0..1	<a href="#">PropertyReference</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
1..1	GridStateIntensitySchedule	0..*	<a href="#">GridStateIntensitySchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..*	GridStateAlterationRemedialAction	0..1	<a href="#">GridStateAlterationRemedialAction</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	ControllableQuantity	0..*	<a href="#">ControllableQuantity</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	RangeConstraint	0..*	<a href="#">RangeConstraint</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	GridStateAlterationSchedule	0..*	<a href="#">GridStateAlterationSchedule</a>	(NC) inherited from: <a href="#">GridStateAlteration</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4772

4773

### 3.15.56 (NC) RemedialActionScheduleDependency root class

4774

Remedial action schedule dependency is making two remedial action schedules depending on each other.

4775

4776

Table 532 shows all attributes of RemedialActionScheduleDependency.

4777

**Table 532 – Attributes of ExtRemedialAction::RemedialActionScheduleDependency**

name	mult	type	description
kind	0..1	<a href="#">RemedialActionScheduleDependencyKind</a>	(NC) Type of dependency between two remedial action schedules.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4778

4779 Table 533 shows all association ends of RemedialActionScheduleDependency with other  
4780 classes.

4781 **Table 533 – Association ends of**  
4782 **ExtRemedialAction::RemedialActionScheduleDependency with other classes**

mult from	name	mult to	type	description
0..*	ProposedRemedialActionSchedule	0..1	<a href="#">RemedialActionSchedule</a>	(NC) Proposed remedial action schedule that has dependency.
0..*	ReplacedRemedialActionSchedule	0..1	<a href="#">RemedialActionSchedule</a>	(NC) Remedial action schedule that is replaced by dependent remedial action schedule.
0..*	RemedialActionScheduleGroup	0..1	<a href="#">RemedialActionScheduleGroup</a>	(NC) Remedial action schedule group which has remedial action schedule dependency.

4783

4784 **3.15.57 (NC) RemedialActionScheduleDependencyKind enumeration**

4785 Kind of dependency between remedial action schedules.

4786 Table 534 shows all literals of RemedialActionScheduleDependencyKind.

4787 **Table 534 – Literals of ExtRemedialAction::RemedialActionScheduleDependencyKind**

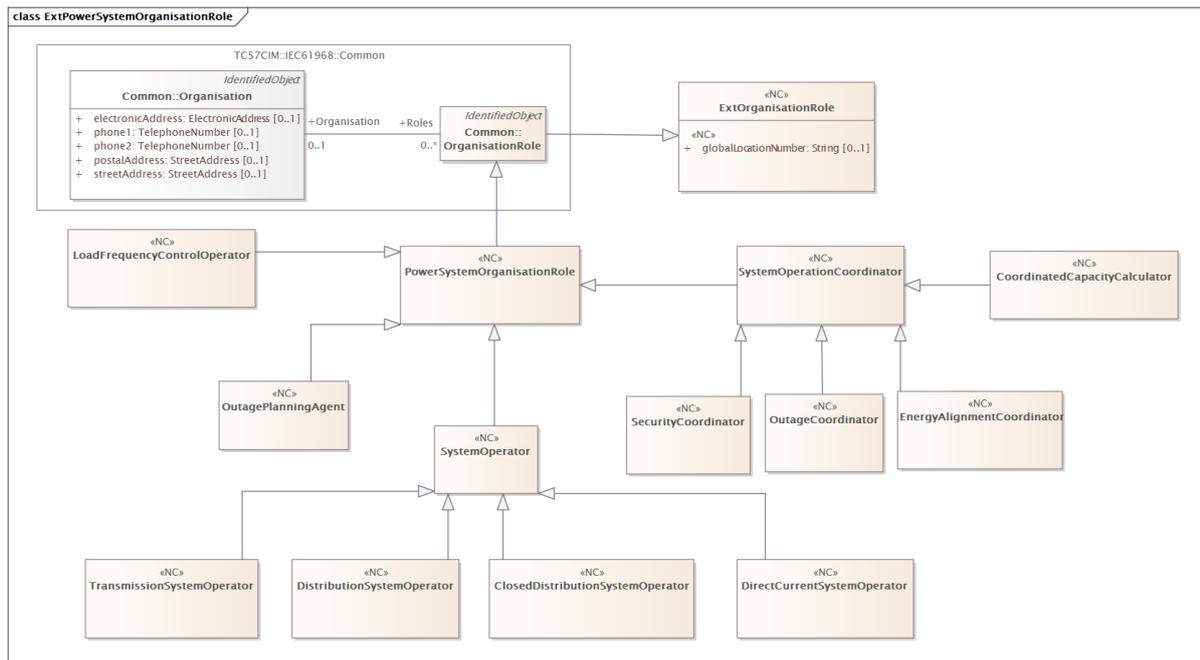
literal	value	description
exclusive		Remedial action schedules are exclusive depending on each other. e.g. Only one of the remedial action schedules can be selected at the same time.
inclusive		Remedial action schedules are inclusive depending on each other. e.g. Both remedial action schedules need to be picked if one of them is needed.
none		Remedial action schedules are not depending on each other. However, the two remedial action schedules should be evaluated together.

4788

4789 **3.16 Package ExtRole**

4790 **3.16.1 General**

4791 This package contains the extensions related to the roles.



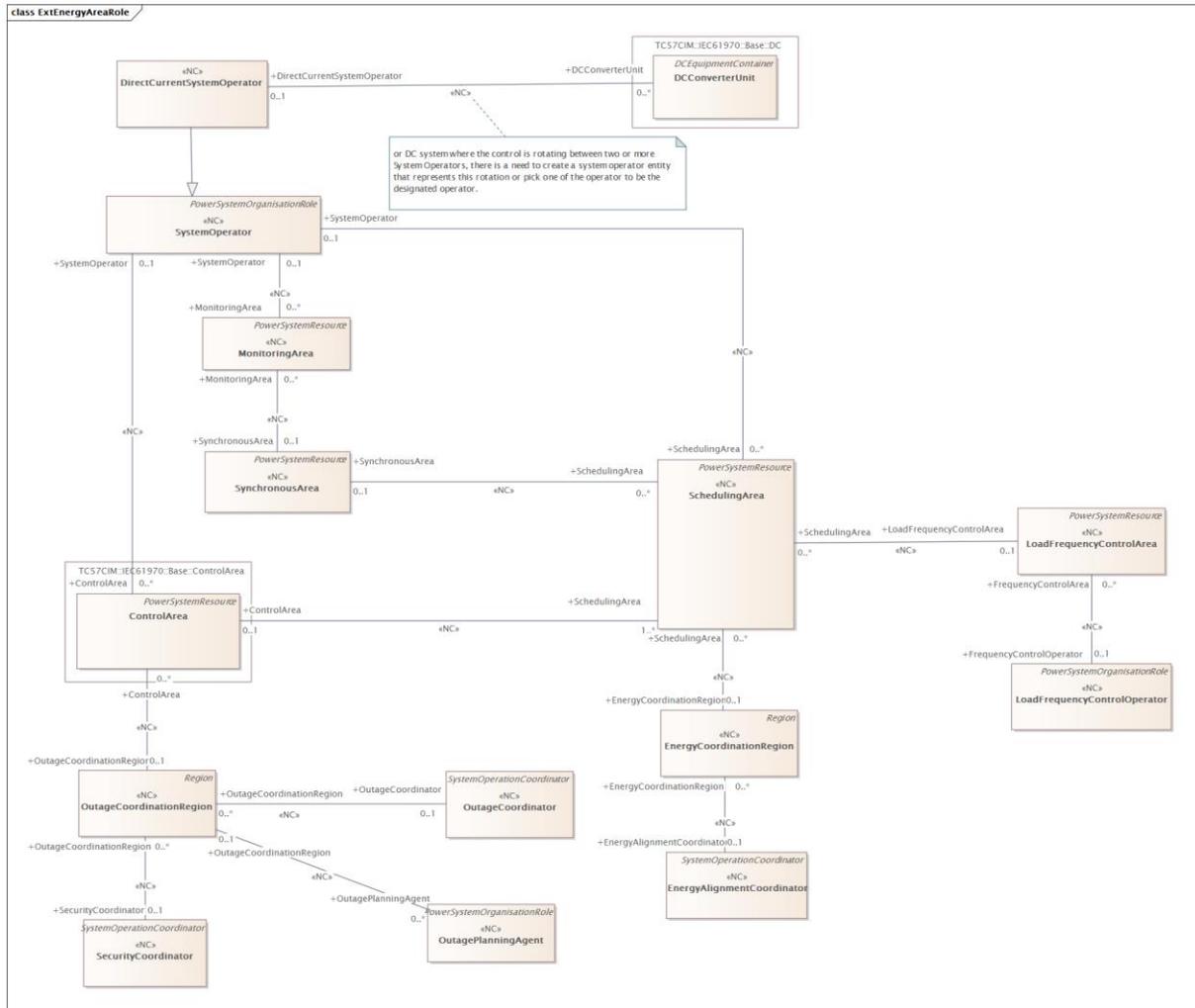
4792

4793

**Figure 48 – Class diagram ExtRole::ExtPowerSystemOrganisationRole**

4794

Figure 48: The diagram contains classes related to power system organization role.



4795

4796

**Figure 49 – Class diagram ExtRole::ExtEnergyAreaRole**

4797 Figure 49: The diagram contains classes related to energy area role.

4798 **3.16.2 (NC) CoordinatedCapacityCalculator**

4799 Inheritance path = [SystemOperationCoordinator](#) : [PowerSystemOrganisationRole](#) :

4800 OrganisationRole : IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

4801 A role that coordinates and executes the task of calculating transmission capacity.

4802 Table 535 shows all attributes of CoordinatedCapacityCalculator.

4803

**Table 535 – Attributes of ExtRole::CoordinatedCapacityCalculator**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4804

4805 Table 536 shows all association ends of CoordinatedCapacityCalculator with other classes.

4806 **Table 536 – Association ends of ExtRole::CoordinatedCapacityCalculator with other**  
4807 **classes**

mult from	name	mult to	type	description
0..1	CapacityCalculationRegion	0..*	<a href="#">CapacityCalculationRegion</a>	(NC) Capacity calculation region in which the capacity is calculated by the coordinated capacity calculator.
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4808

### 4809 3.16.3 (NC) ClosedDistributionSystemOperator

4810 Inheritance path = [SystemOperator](#) : [PowerSystemOrganisationRole](#) : OrganisationRole :  
4811 IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

4812 A system operator which distributes electricity (or gas) within a geographically confined  
4813 industrial, commercial or shared services and does not supply household customers.

4814 Table 537 shows all attributes of ClosedDistributionSystemOperator.

4815 **Table 537 – Attributes of ExtRole::ClosedDistributionSystemOperator**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4816

4817 Table 538 shows all association ends of ClosedDistributionSystemOperator with other classes.

4818 **Table 538 – Association ends of ExtRole::ClosedDistributionSystemOperator with other**  
4819 **classes**

mult from	name	mult to	type	description
0..1	ControlArea	0..*	ControlArea	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	Contingency	0..*	Contingency	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	Fault	0..*	Fault	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	SchedulingArea	0..*	<a href="#">SchedulingArea</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	MonitoringArea	0..*	<a href="#">MonitoringArea</a>	(NC) inherited from: <a href="#">SystemOperator</a>
1..1	OutcomeValue	0..*	<a href="#">OutcomeValue</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	RemedialAction	0..*	<a href="#">RemedialAction</a>	(NC) inherited from: <a href="#">SystemOperator</a>

mult from	name	mult to	type	description
0..1	ProposingRemedialActionScheduleShare	0..*	<a href="#">ProposingRemedialActionScheduleShare</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	AssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	OwnerRemedialActionAssessment	0..*	<a href="#">OwnerRemedialActionAssessment</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	RemedialActionImpact	0..*	<a href="#">RemedialActionImpact</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	RemedialActionScheduleAcceptance	0..*	<a href="#">RemedialActionScheduleAcceptance</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4820

4821 **3.16.4 (NC) DirectCurrentSystemOperator**

4822 Inheritance path = [SystemOperator](#) : [PowerSystemOrganisationRole](#) : OrganisationRole :  
4823 IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

4824 System operator of the direct current pole. There are typically one or two system operators that  
4825 are operating either the control area at one side or the control areas at both sides of the direct  
4826 current pole. In some cases it is operated by an operator from the connected control areas.

4827 Table 539 shows all attributes of DirectCurrentSystemOperator.

4828

**Table 539 – Attributes of ExtRole::DirectCurrentSystemOperator**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4829

4830 Table 540 shows all association ends of DirectCurrentSystemOperator with other classes.

**Table 540 – Association ends of ExtRole::DirectCurrentSystemOperator with other classes**

mult from	name	mult to	type	description
0..1	DCConverterUnit	0..*	DCConverterUnit	(NC) The DC converter unit operated by this direct current system operator.
0..1	ControlArea	0..*	ControlArea	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	Contingency	0..*	Contingency	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	Fault	0..*	Fault	(NC) inherited from: <a href="#">SystemOperator</a>

4831

4832

mult from	name	mult to	type	description
0..1	SchedulingArea	0..*	<a href="#">SchedulingArea</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	MonitoringArea	0..*	<a href="#">MonitoringArea</a>	(NC) inherited from: <a href="#">SystemOperator</a>
1..1	OutcomeValue	0..*	<a href="#">OutcomeValue</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	RemedialAction	0..*	<a href="#">RemedialAction</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	ProposingRemedialActionScheduleShare	0..*	<a href="#">ProposingRemedialActionScheduleShare</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	AssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	OwnerRemedialActionAssessment	0..*	<a href="#">OwnerRemedialActionAssessment</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	RemedialActionImpact	0..*	<a href="#">RemedialActionImpact</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	RemedialActionScheduleAcceptance	0..*	<a href="#">RemedialActionScheduleAcceptance</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4833

4834 **3.16.5 (NC) DistributionSystemOperator**

4835 Inheritance path = [SystemOperator](#) : [PowerSystemOrganisationRole](#) : OrganisationRole :  
 4836 IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

4837 A system operator that is responsible for operating of energy distribution network from  
 4838 transmission level down to low voltage levels including the connection to household.

4839 Table 541 shows all attributes of DistributionSystemOperator.

4840

**Table 541 – Attributes of ExtRole::DistributionSystemOperator**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4841

4842 Table 542 shows all association ends of DistributionSystemOperator with other classes.

**Table 542 – Association ends of ExtRole::DistributionSystemOperator with other classes**

4843

4844

mult from	name	mult to	type	description
0..1	ControlArea	0..*	ControlArea	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	Contingency	0..*	Contingency	(NC) inherited from: <a href="#">SystemOperator</a>

mult from	name	mult to	type	description
0..1	Fault	0..*	Fault	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	SchedulingArea	0..*	<a href="#">SchedulingArea</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	MonitoringArea	0..*	<a href="#">MonitoringArea</a>	(NC) inherited from: <a href="#">SystemOperator</a>
1..1	OutcomeValue	0..*	<a href="#">OutcomeValue</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	RemedialAction	0..*	<a href="#">RemedialAction</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	ProposingRemedialActionScheduleShare	0..*	<a href="#">ProposingRemedialActionScheduleShare</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	AssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	OwnerRemedialActionAssessment	0..*	<a href="#">OwnerRemedialActionAssessment</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	RemedialActionImpact	0..*	<a href="#">RemedialActionImpact</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	RemedialActionScheduleAcceptance	0..*	<a href="#">RemedialActionScheduleAcceptance</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4845

4846 **3.16.6 (NC) EnergyAlignmentCoordinator**4847 Inheritance path = [SystemOperationCoordinator](#) : [PowerSystemOrganisationRole](#) :4848 OrganisationRole : IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

4849 A role that is responsible for alignment of forecast and schedule energy to a given energy

4850 coordination region.

4851 Table 543 shows all attributes of EnergyAlignmentCoordinator.

4852

**Table 543 – Attributes of ExtRole::EnergyAlignmentCoordinator**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4853

4854 Table 544 shows all association ends of EnergyAlignmentCoordinator with other classes.

4855 **Table 544 – Association ends of ExtRole::EnergyAlignmentCoordinator with other**  
4856 **classes**

mult from	name	mult to	type	description
0..1	EnergyCoordinationRegion	0..*	<a href="#">EnergyCoordinationRegion</a>	(NC) The energy coordination region that has this energy alignment coordinator.
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4857

4858 **3.16.7 (NC) ExtOrganisationRole root class**

4859 Organisation role NC extension class.

4860 Table 545 shows all attributes of ExtOrganisationRole.

4861 **Table 545 – Attributes of ExtRole::ExtOrganisationRole**

name	mult	type	description
globalLocationNumber	0..1	String	(NC) The Global Location Number (GLN) is part of the GS1 systems of standards. GLN is a 13-digit number structured that include GS1 Company Prefix, Location Reference (N1-N12) and Check Digit (N13). GS1 is a neutral, not-for-profit, international organisation that develops and maintains standards for supply and demand chains across multiple sectors.

4862

4863 **3.16.8 (NC) LoadFrequencyControlOperator**4864 Inheritance path = [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject :  
4865 ExtEulIdentifiedObject : [ExtOrganisationRole](#)4866 A role that is responsible for operational security by operating the load frequency control (LFC)  
4867 mechanism.

4868 Table 546 shows all attributes of LoadFrequencyControlOperator.

4869 **Table 546 – Attributes of ExtRole::LoadFrequencyControlOperator**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4870

4871 Table 547 shows all association ends of LoadFrequencyControlOperator with other classes.

4872  
4873**Table 547 – Association ends of ExtRole::LoadFrequencyControlOperator with other classes**

mult from	name	mult to	type	description
0..1	FrequencyControlArea	0..*	<a href="#">LoadFrequencyControlArea</a>	(NC) The frequency control area that has this frequency control operator.
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4874

**4875 3.16.9 (NC) OutageCoordinator**

4876 Inheritance path = [SystemOperationCoordinator](#) : [PowerSystemOrganisationRole](#) :  
 4877 OrganisationRole : IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

4878 A role that coordinates the planned availability status of relevant power system equipment to  
 4879 meet the need by the asset owner or operator and the security of the power system.

4880 Table 548 shows all attributes of OutageCoordinator.

4881

**Table 548 – Attributes of ExtRole::OutageCoordinator**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4882

4883 Table 549 shows all association ends of OutageCoordinator with other classes.

4884

**Table 549 – Association ends of ExtRole::OutageCoordinator with other classes**

mult from	name	mult to	type	description
0..1	OutageCoordinationRegion	0..*	<a href="#">OutageCoordinationRegion</a>	(NC) The outage coordination region that has this outage coordinator.
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4885

4886 **3.16.10 (NC) OutagePlanningAgent**4887 Inheritance path = [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject :  
4888 ExtEulIdentifiedObject : [ExtOrganisationRole](#)4889 An entity with the task of planning the availability status of a relevant power generating module,  
4890 a relevant demand facility or a relevant grid element.

4891 Table 550 shows all attributes of OutagePlanningAgent.

4892 **Table 550 – Attributes of ExtRole::OutagePlanningAgent**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4893

4894 Table 551 shows all association ends of OutagePlanningAgent with other classes.

4895 **Table 551 – Association ends of ExtRole::OutagePlanningAgent with other classes**

mult from	name	mult to	type	description
0..*	OutageCoordinationRegion	0..1	<a href="#">OutageCoordinationRegion</a>	(NC) Outage coordination region that this agent has outage planning responsible.
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4896

4897 **3.16.11 (NC) PowerSystemOrganisationRole**4898 Inheritance path = OrganisationRole : IdentifiedObject : ExtEulIdentifiedObject :  
4899 [ExtOrganisationRole](#)

4900 A role that is responsible for the functional operational of a power system resource.

4901 Table 552 shows all attributes of PowerSystemOrganisationRole.

4902 **Table 552 – Attributes of ExtRole::PowerSystemOrganisationRole**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

name	mult	type	description
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4903

4904

Table 553 shows all association ends of PowerSystemOrganisationRole with other classes.

4905

**Table 553 – Association ends of ExtRole::PowerSystemOrganisationRole with other classes**

4906

mult from	name	mult to	type	description
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4907

4908

### 3.16.12 (NC) SecurityCoordinator

4909

Inheritance path = [SystemOperationCoordinator](#) : [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)

4910

4911

A role that coordinates the relevant remedial actions and their optimisation to ensure efficient use to achieve required operational security of the power system.

4912

4913

Table 554 shows all attributes of SecurityCoordinator.

4914

**Table 554 – Attributes of ExtRole::SecurityCoordinator**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4915

4916

Table 555 shows all association ends of SecurityCoordinator with other classes.

4917

**Table 555 – Association ends of ExtRole::SecurityCoordinator with other classes**

mult from	name	mult to	type	description
0..1	OutageCoordinationRegion	0..*	<a href="#">OutageCoordinationRegion</a>	(NC) The outage coordination region that has this security coordinator.
0..1	CapacityCalculationRegion	0..*	<a href="#">CapacityCalculationRegion</a>	(NC) The capacity calculation region operated by this security coordinator.
0..1	RemedialActionSchedule	0..*	<a href="#">RemedialActionSchedule</a>	(NC) Remedial action schedule for this security coordinator.
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4918

4919 **3.16.13 (NC) SystemOperator**4920 Inheritance path = [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject :4921 ExtEulIdentifiedObject : [ExtOrganisationRole](#)

4922 System operator.

4923 Table 556 shows all attributes of SystemOperator.

4924

**Table 556 – Attributes of ExtRole::SystemOperator**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4925

4926 Table 557 shows all association ends of SystemOperator with other classes.

4927

**Table 557 – Association ends of ExtRole::SystemOperator with other classes**

mult from	name	mult to	type	description
0..1	ControlArea	0..*	ControlArea	(NC) The control area that is related to this system operator.
0..1	Contingency	0..*	Contingency	(NC) Contingency for the equipment that is operated by the system operator.
0..1	Fault	0..*	Fault	(NC) The faults that have occurred in this System Operator's control area.
0..1	SchedulingArea	0..*	<a href="#">SchedulingArea</a>	(NC) The scheduling area that is operated by this system operator.
0..1	MonitoringArea	0..*	<a href="#">MonitoringArea</a>	(NC) The monitoring area that is operated by this system operator.
1..1	OutcomeValue	0..*	<a href="#">OutcomeValue</a>	(NC) Impact assessment outcome value for this impacted system operator.
0..1	RemedialAction	0..*	<a href="#">RemedialAction</a>	(NC) Remedial action defined by this system operator.
0..1	ProposingRemedialActionScheduleShare	0..*	<a href="#">ProposingRemedialActionScheduleShare</a>	(NC) Proposing remedial action schedule share which is made by the proposing entity.
0..1	AssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) All relevant network elements on which operational security violations need to be managed in a coordinated way.

mult from	name	mult to	type	description
0..1	OwnerRemedialActionAssessment	0..*	<a href="#">OwnerRemedialActionAssessment</a>	(NC) Owner's assessment of the remedial action.
0..1	RemedialActionImpact	0..*	<a href="#">RemedialActionImpact</a>	(NC) The remedial action impact for a given assessing System Operator.
0..1	RemedialActionScheduleAcceptance	0..*	<a href="#">RemedialActionScheduleAcceptance</a>	(NC) Remedial action schedule acceptance related to a system operator.
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4928

4929 **3.16.14 (NC) SystemOperationCoordinator**4930 Inheritance path = [PowerSystemOrganisationRole](#) : OrganisationRole : IdentifiedObject :  
4931 ExtEulIdentifiedObject : [ExtOrganisationRole](#)4932 A role that coordinates relevant information and impact in regards to operating the power  
4933 system.

4934 Table 558 shows all attributes of SystemOperationCoordinator.

4935 **Table 558 – Attributes of ExtRole::SystemOperationCoordinator**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4936

4937 Table 559 shows all association ends of SystemOperationCoordinator with other classes.

4938 **Table 559 – Association ends of ExtRole::SystemOperationCoordinator with other  
4939 classes**

mult from	name	mult to	type	description
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4940

4941 **3.16.15 (NC) TransmissionSystemOperator**

4942 Inheritance path = [SystemOperator](#) : [PowerSystemOrganisationRole](#) : OrganisationRole :  
4943 IdentifiedObject : ExtEulIdentifiedObject : [ExtOrganisationRole](#)  
4944 A system operator role that is responsible for operating of an energy transmission network.  
4945 Table 560 shows all attributes of TransmissionSystemOperator.

4946 **Table 560 – Attributes of ExtRole::TransmissionSystemOperator**

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: <a href="#">ExtOrganisationRole</a>

4947  
4948 Table 561 shows all association ends of TransmissionSystemOperator with other classes.

4949 **Table 561 – Association ends of ExtRole::TransmissionSystemOperator with other classes**  
4950

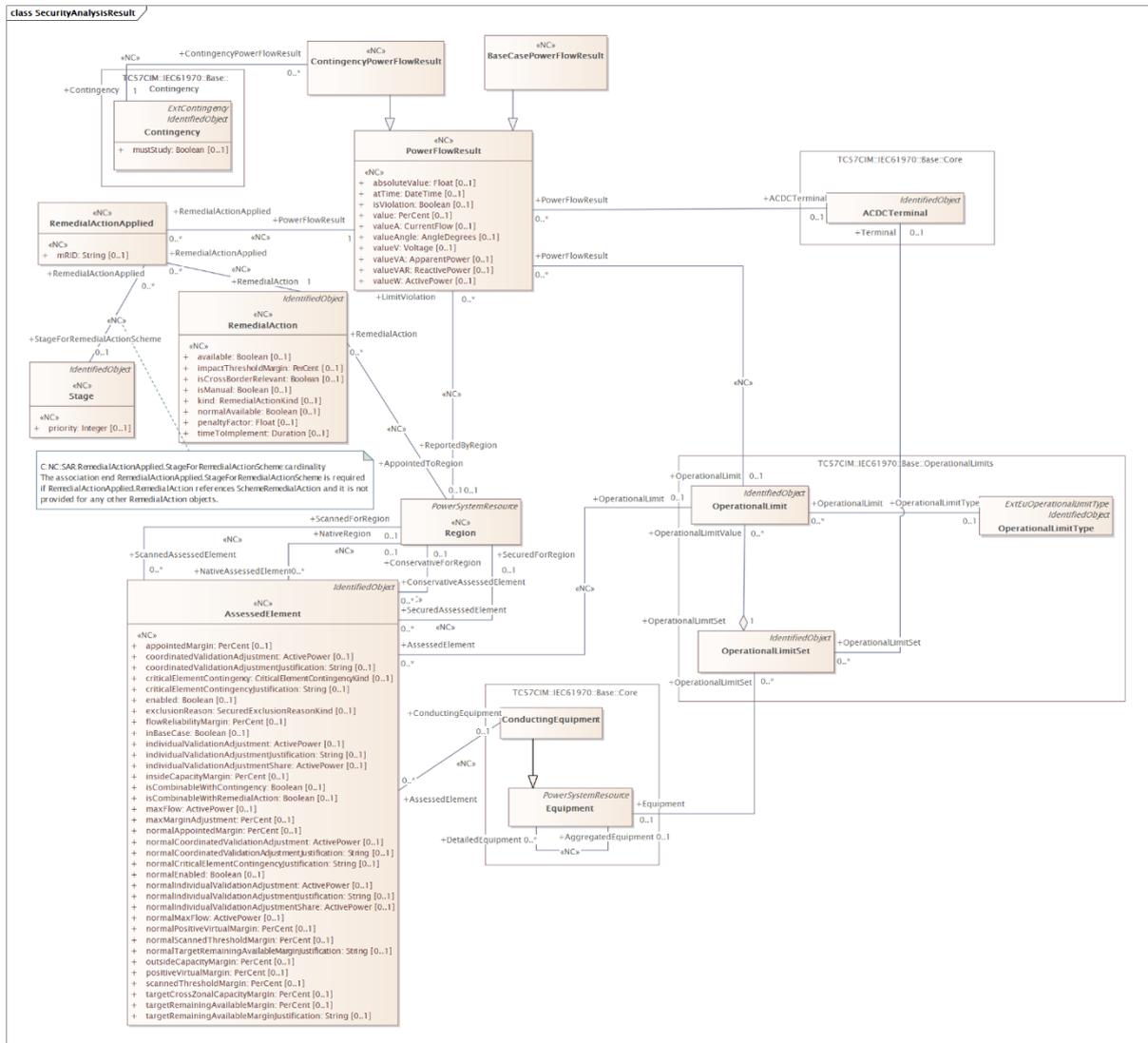
mult from	name	mult to	type	description
0..1	ControlArea	0..*	ControlArea	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	Contingency	0..*	Contingency	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	Fault	0..*	Fault	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	SchedulingArea	0..*	<a href="#">SchedulingArea</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	MonitoringArea	0..*	<a href="#">MonitoringArea</a>	(NC) inherited from: <a href="#">SystemOperator</a>
1..1	OutcomeValue	0..*	<a href="#">OutcomeValue</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	RemedialAction	0..*	<a href="#">RemedialAction</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	ProposingRemedialActionScheduleShare	0..*	<a href="#">ProposingRemedialActionScheduleShare</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	AssessedElement	0..*	<a href="#">AssessedElement</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	OwnerRemedialActionAssessment	0..*	<a href="#">OwnerRemedialActionAssessment</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	RemedialActionImpact	0..*	<a href="#">RemedialActionImpact</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..1	RemedialActionScheduleAcceptance	0..*	<a href="#">RemedialActionScheduleAcceptance</a>	(NC) inherited from: <a href="#">SystemOperator</a>
0..*	Organisation	0..1	Organisation	inherited from: OrganisationRole
0..1	ConfigurationEvents	0..*	ConfigurationEvent	inherited from: OrganisationRole
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

4951

4952 **3.17 Security analysis result extensions**

4953 **3.17.1 General**

4954 This package contains the extensions related to the security analysis result.



4955

4956 **Figure 50 – Class diagram ExtSecurityAnalysisResult::SecurityAnalysisResult**

4957 Figure 50: The diagram contains classes related to the security analysis result.

4958 **3.17.2 (NC) BaseCasePowerFlowResult**

4959 Inheritance path = [PowerFlowResult](#)

4960 Base case power flow result for a given terminal.

4961 Table 562 shows all attributes of BaseCasePowerFlowResult.

4962 **Table 562 – Attributes of ExtSecurityAnalysisResult::BaseCasePowerFlowResult**

name	mult	type	description
value	0..1	PerCent	(NC) inherited from: <a href="#">PowerFlowResult</a>
absoluteValue	0..1	Float	(NC) inherited from: <a href="#">PowerFlowResult</a>
atTime	0..1	DateTime	(NC) inherited from: <a href="#">PowerFlowResult</a>

name	mult	type	description
isViolation	0..1	Boolean	(NC) inherited from: <a href="#">PowerFlowResult</a>
valueW	0..1	ActivePower	(NC) inherited from: <a href="#">PowerFlowResult</a>
valueVA	0..1	ApparentPower	(NC) inherited from: <a href="#">PowerFlowResult</a>
valueV	0..1	Voltage	(NC) inherited from: <a href="#">PowerFlowResult</a>
valueAngle	0..1	AngleDegrees	(NC) inherited from: <a href="#">PowerFlowResult</a>
valueA	0..1	CurrentFlow	(NC) inherited from: <a href="#">PowerFlowResult</a>
valueVAR	0..1	ReactivePower	(NC) inherited from: <a href="#">PowerFlowResult</a>

4963

4964

Table 563 shows all association ends of BaseCasePowerFlowResult with other classes.

4965

**Table 563 – Association ends of ExtSecurityAnalysisResult::BaseCasePowerFlowResult with other classes**

4966

mult from	name	mult to	type	description
0..*	ACDCTerminal	0..1	ACDCTerminal	inherited from: <a href="#">PowerFlowResult</a>
0..*	OperationalLimit	0..1	OperationalLimit	(NC) inherited from: <a href="#">PowerFlowResult</a>
0..*	ReportedByRegion	0..1	<a href="#">Region</a>	(NC) inherited from: <a href="#">PowerFlowResult</a>
1..1	RemedialActionApplied	0..*	<a href="#">RemedialActionApplied</a>	(NC) inherited from: <a href="#">PowerFlowResult</a>

4967

4968

### 3.17.3 (NC) ContingencyPowerFlowResult

4969

Inheritance path = [PowerFlowResult](#)

4970

Contingency power flow result on a given terminal for a given contingency.

4971

Table 564 shows all attributes of ContingencyPowerFlowResult.

4972

**Table 564 – Attributes of ExtSecurityAnalysisResult::ContingencyPowerFlowResult**

name	mult	type	description
value	0..1	PerCent	(NC) inherited from: <a href="#">PowerFlowResult</a>
absoluteValue	0..1	Float	(NC) inherited from: <a href="#">PowerFlowResult</a>
atTime	0..1	DateTime	(NC) inherited from: <a href="#">PowerFlowResult</a>
isViolation	0..1	Boolean	(NC) inherited from: <a href="#">PowerFlowResult</a>
valueW	0..1	ActivePower	(NC) inherited from: <a href="#">PowerFlowResult</a>
valueVA	0..1	ApparentPower	(NC) inherited from: <a href="#">PowerFlowResult</a>
valueV	0..1	Voltage	(NC) inherited from: <a href="#">PowerFlowResult</a>
valueAngle	0..1	AngleDegrees	(NC) inherited from: <a href="#">PowerFlowResult</a>
valueA	0..1	CurrentFlow	(NC) inherited from: <a href="#">PowerFlowResult</a>
valueVAR	0..1	ReactivePower	(NC) inherited from: <a href="#">PowerFlowResult</a>

4973

4974

Table 565 shows all association ends of ContingencyPowerFlowResult with other classes.

4975

**Table 565 – Association ends of ExtSecurityAnalysisResult::ContingencyPowerFlowResult with other classes**

4976

mult from	name	mult to	type	description
0..*	Contingency	1..1	Contingency	(NC) The contingency that has this power flow result.

mult from	name	mult to	type	description
0..*	ACDCTerminal	0..1	ACDCTerminal	inherited from: <a href="#">PowerFlowResult</a>
0..*	OperationalLimit	0..1	OperationalLimit	(NC) inherited from: <a href="#">PowerFlowResult</a>
0..*	ReportedByRegion	0..1	<a href="#">Region</a>	(NC) inherited from: <a href="#">PowerFlowResult</a>
1..1	RemedialActionApplied	0..*	<a href="#">RemedialActionApplied</a>	(NC) inherited from: <a href="#">PowerFlowResult</a>

4977

4978 **3.17.4 (NC) PowerFlowResult root class**

4979 Power flow result including any operational limit violation.

4980 Table 566 shows all attributes of PowerFlowResult.

4981

**Table 566 – Attributes of ExtSecurityAnalysisResult::PowerFlowResult**

name	mult	type	description
value	0..1	PerCent	(NC) The value of the limit violation in percent related to the value of the operational limit that is violated. For instance, if the operational limit is 1000 A and the current flow is 1100 A the value is reported as 110 %.
absoluteValue	0..1	Float	(NC) Absolute value from a power flow calculation on a given terminal related to a given operational limit. For instance, if the operational limit is 1000 A and the current flow is 1100 A the absoluteValue is reported as 1100 A.
atTime	0..1	DateTime	(NC) The date and time of the scenario time that was studied and at which the limit violation occurred.
isViolation	0..1	Boolean	(NC) True if the power flow result is violating the associated operational limit. False if it is not violating the associated operational limits.
valueW	0..1	ActivePower	(NC) Active power value from a power flow calculation on a given terminal. Load sign convention is used, i.e. positive sign means flow out from a TopologicalNode (bus) into the conducting equipment.
valueVA	0..1	ApparentPower	(NC) Apparent power value from a power flow calculation on a given terminal.
valueV	0..1	Voltage	(NC) Voltage value from a power flow calculation on a given terminal. The attribute shall be a positive value.
valueAngle	0..1	AngleDegrees	(NC) Voltage angle value from a power flow calculation on a given terminal.
valueA	0..1	CurrentFlow	(NC) Current from a power flow calculation on a given terminal. The value shall be a positive value or zero.
valueVAR	0..1	ReactivePower	(NC) Reactive power value from a power flow calculation on a given terminal. Load sign convention is used, i.e. positive sign means flow out from a TopologicalNode (bus) into the conducting equipment.

4982

4983 Table 567 shows all association ends of PowerFlowResult with other classes.

4984 **Table 567 – Association ends of ExtSecurityAnalysisResult::PowerFlowResult with**  
4985 **other classes**

mult from	name	mult to	type	description
0..*	ACDCTerminal	0..1	ACDCTerminal	ACDC terminal where the powerflow result is located.
0..*	OperationalLimit	0..1	OperationalLimit	(NC) The operational limit that has this limit violation.
0..*	ReportedByRegion	0..1	<a href="#">Region</a>	(NC) The region which reports this limit violation.
1..1	RemedialActionApplied	0..*	<a href="#">RemedialActionApplied</a>	(NC) Remedial action that is applied when the power flow result is calculated.

4986

### 4987 3.17.5 (NC) RemedialActionApplied root class

4988 Remedial Action or Remedial Action Stage that has been applied to the power flow case which  
4989 has the associated power flow result.

4990 Table 568 shows all attributes of RemedialActionApplied.

4991 **Table 568 – Attributes of ExtSecurityAnalysisResult::RemedialActionApplied**

name	mult	type	description
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

4992

4993 Table 569 shows all association ends of RemedialActionApplied with other classes.

4994 **Table 569 – Association ends of ExtSecurityAnalysisResult::RemedialActionApplied**  
4995 **with other classes**

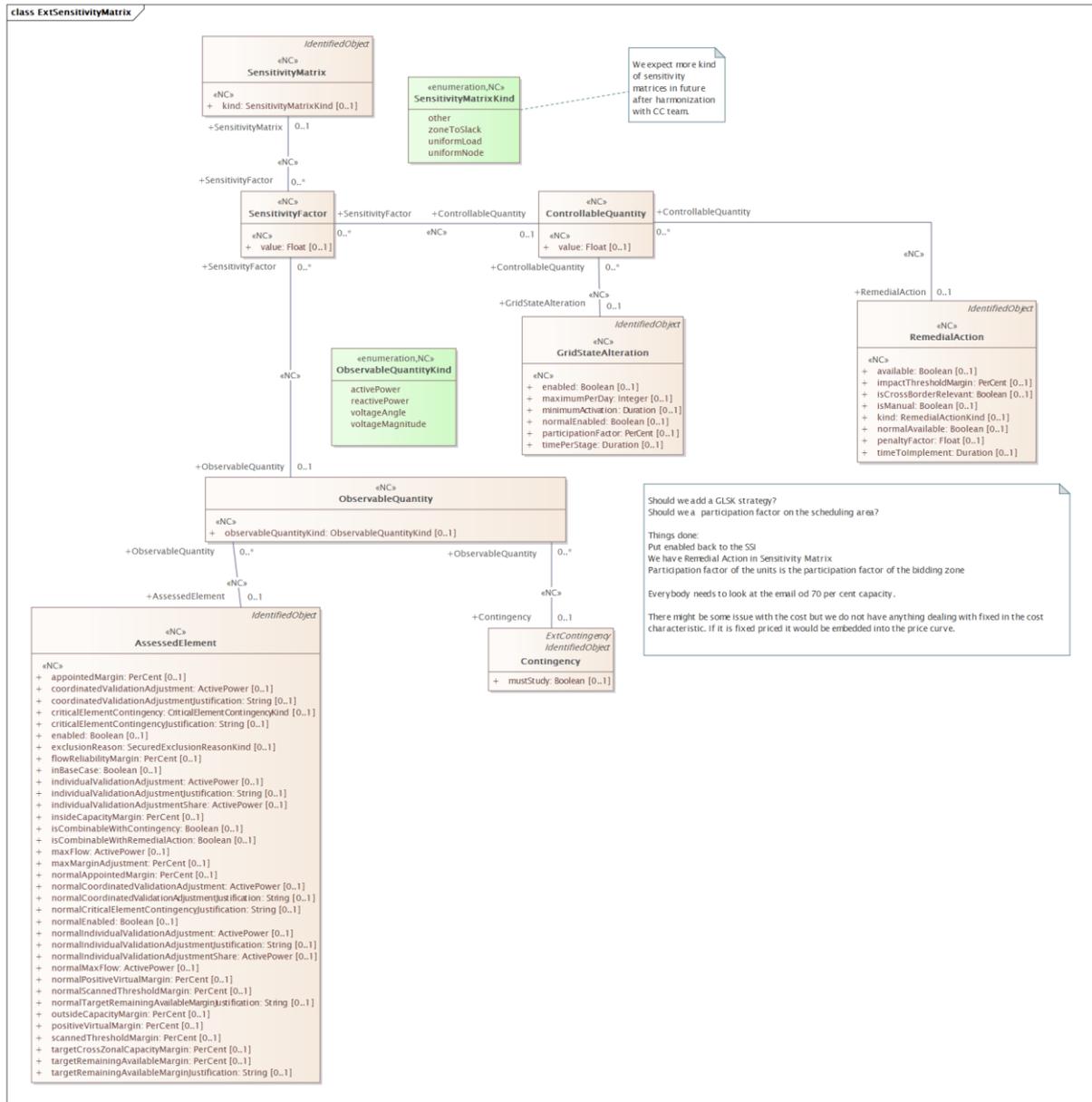
mult from	name	mult to	type	description
0..*	StageForRemedialActionScheme	0..1	<a href="#">Stage</a>	(NC) The stage of the remedial action scheme that is applied.
0..*	RemedialAction	1..1	<a href="#">RemedialAction</a>	(NC) Remedial action that is applied.
0..*	PowerFlowResult	1..1	<a href="#">PowerFlowResult</a>	(NC) Power flow result that is obtained when the remedial action is applied.

4996

## 4997 3.18 Package ExtSensitivityMatrix

### 4998 3.18.1 General

4999 This package contains extensions related to sensitivity matrix.



5000

5001 **Figure 51 – Class diagram ExtSensitivityMatrix::ExtSensitivityMatrix**

5002 Figure 51: The diagram contains classes related to sensitivity matrix.

5003 **3.18.2 (NC) ControllableQuantity root class**

5004 Controllable quantity is a set point quantity on a grid state alteration or on a remedial action.  
5005 Table 570 shows all attributes of ControllableQuantity.

5006 **Table 570 – Attributes of ExtSensitivityMatrix::ControllableQuantity**

name	mult	type	description
value	0..1	Float	(NC) The value of the change applied to the grid state alteration or remedial action. In the case of multiple changes or non-quantifiable changes (e.g. Topology changes) the value needs to represent the suitable value that makes the derivable value given in the observable quantity for the purpose of the calculation of the

name	mult	type	description
			sensitivity factor. The value can be integer, float or boolean. In case of boolean 1 equals true and 0 equals false.

5007

5008

Table 571 shows all association ends of ControllableQuantity with other classes.

5009

**Table 571 – Association ends of ExtSensitivityMatrix::ControllableQuantity with other classes**

5010

mult from	name	mult to	type	description
0..*	GridStateAlteration	0..1	<a href="#">GridStateAlteration</a>	(NC) The grid state alteration for this controllable quantity.
0..*	RemedialAction	0..1	<a href="#">RemedialAction</a>	(NC) Remedial action which is associated with the controllable quantity.
0..1	SensitivityFactor	0..*	<a href="#">SensitivityFactor</a>	(NC) The sensitivity factor associated with a controllable quantity.

5011

5012

### 3.18.3 (NC) ObservableQuantity root class

5013

Observable quantity is an electrical quantity on an assessed element or an assessed element with contingency.

5014

5015

Table 572 shows all attributes of ObservableQuantity.

5016

**Table 572 – Attributes of ExtSensitivityMatrix::ObservableQuantity**

name	mult	type	description
observableQuantityKind	0..1	<a href="#">ObservableQuantityKind</a>	(NC) Kind of observable quantity.

5017

5018

Table 573 shows all association ends of ObservableQuantity with other classes.

5019

**Table 573 – Association ends of ExtSensitivityMatrix::ObservableQuantity with other classes**

5020

mult from	name	mult to	type	description
0..*	Contingency	0..1	Contingency	(NC) The contingency associated with this observable quantity.
0..*	AssessedElement	0..1	<a href="#">AssessedElement</a>	(NC) The assessed element with contingency associated with this observable quantity.
0..1	SensitivityFactor	0..*	<a href="#">SensitivityFactor</a>	(NC) The sensitivity factor associated with an observable quantity.

5021

5022

### 3.18.4 (NC) SensitivityFactor root class

5023

The sensitivity factor which represents the sensitivity between observable and controllable elements.

5024

5025

Table 574 shows all attributes of SensitivityFactor.

5026

**Table 574 – Attributes of ExtSensitivityMatrix::SensitivityFactor**

name	mult	type	description
value	0..1	Float	(NC) The value of the sensitivity factor.

5027

5028

Table 575 shows all association ends of SensitivityFactor with other classes.

5029 **Table 575 – Association ends of ExtSensitivityMatrix::SensitivityFactor with other**  
5030 **classes**

mult from	name	mult to	type	description
0..*	ControllableQuantity	0..1	<a href="#">ControllableQuantity</a>	(NC) The controllable quantity for this sensitivity factor.
0..*	ObservableQuantity	0..1	<a href="#">ObservableQuantity</a>	(NC) The observable quantity for this sensitivity factor.
0..*	SensitivityMatrix	0..1	<a href="#">SensitivityMatrix</a>	(NC) The sensitivity matrix which contains this sensitivity factor.

5031

### 5032 3.18.5 (NC) SensitivityMatrix

5033 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

5034 The sensitivity matrix which represents the sensitivity factors between observable and  
5035 controllable elements.

5036 Table 576 shows all attributes of SensitivityMatrix.

5037 **Table 576 – Attributes of ExtSensitivityMatrix::SensitivityMatrix**

name	mult	type	description
kind	0..1	<a href="#">SensitivityMatrixKind</a>	(NC) The kind of sensitivity matrix.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5038

5039 Table 577 shows all association ends of SensitivityMatrix with other classes.

5040 **Table 577 – Association ends of ExtSensitivityMatrix::SensitivityMatrix with other**  
5041 **classes**

mult from	name	mult to	type	description
0..1	SensitivityFactor	0..*	<a href="#">SensitivityFactor</a>	(NC) The sensitivity factor which belongs to this sensitivity matrix.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

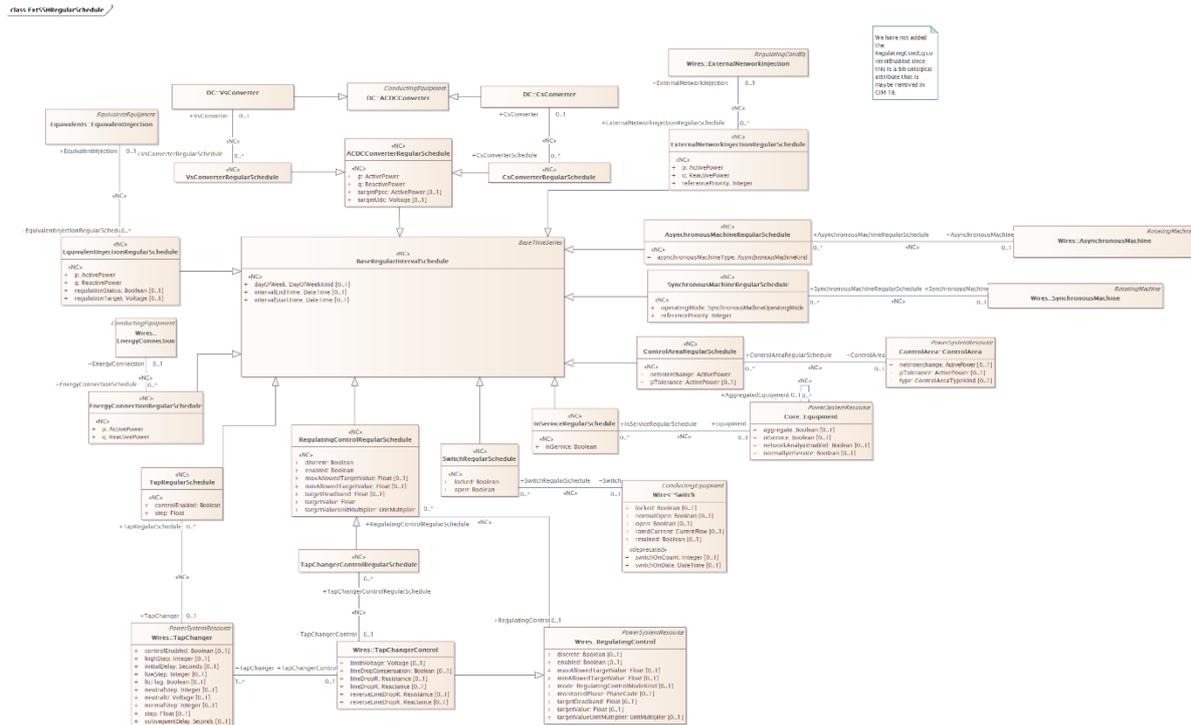
5042

### 5043 3.18.6 (NC) ObservableQuantityKind enumeration

5044 Kind of observable quantity.

5045 Table 578 shows all literals of ObservableQuantityKind.



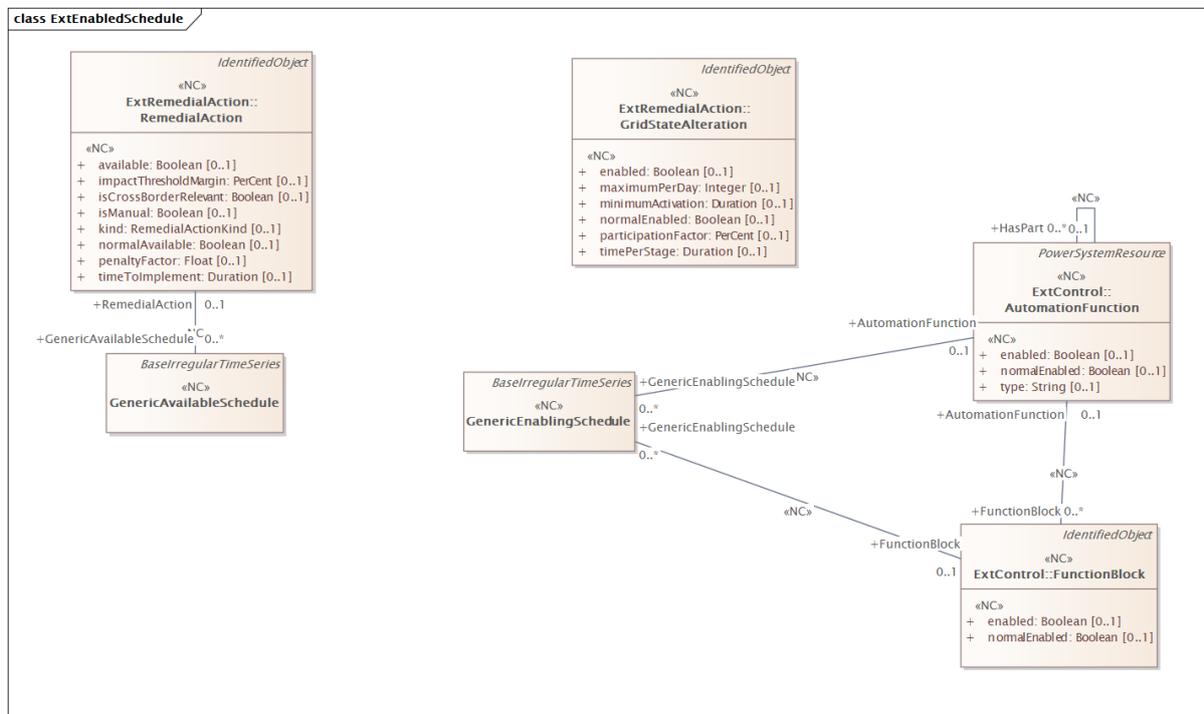


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5060

**Figure 53 – Class diagram ExtSchedule::ExtSSHRegularSchedule**

5061 Figure 53:

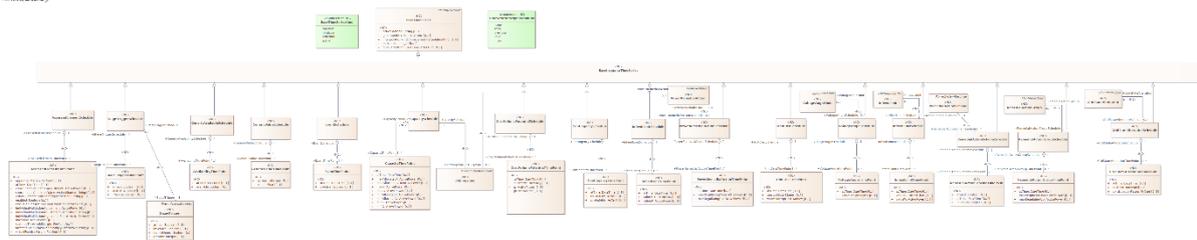


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5063

**Figure 54 – Class diagram ExtSchedule::ExtEnabledSchedule**

5064 Figure 54: The diagram contains classes related to enabled schedule.



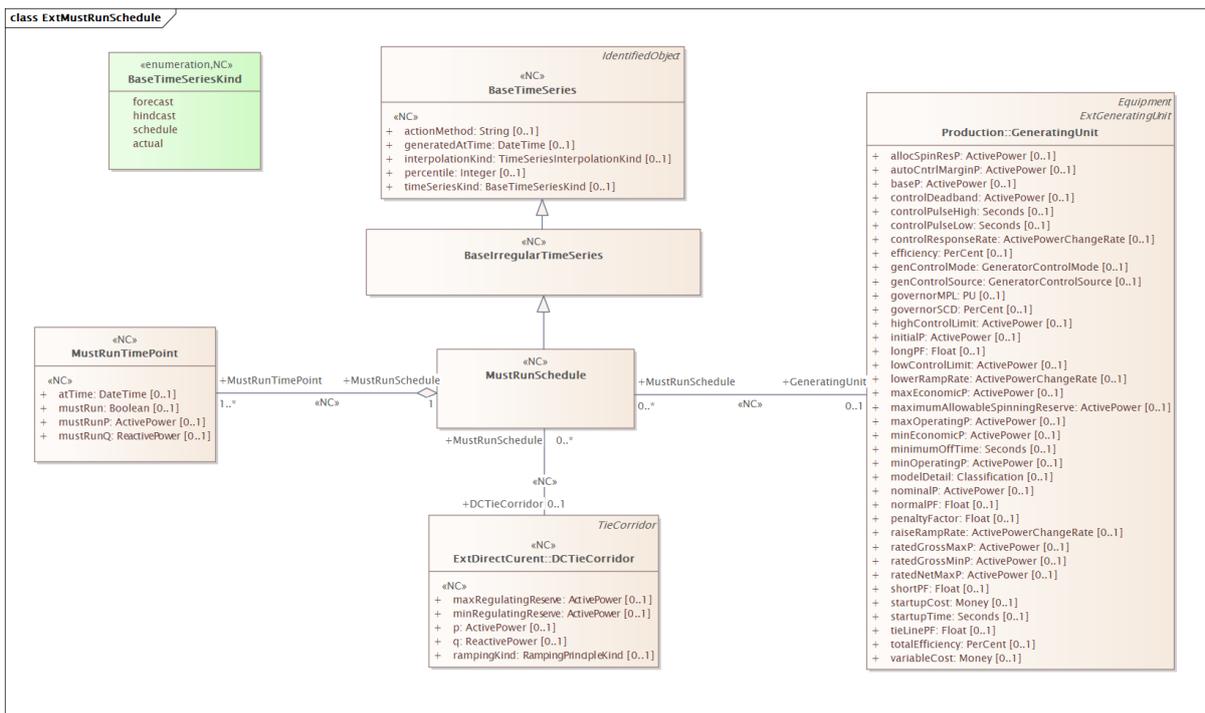
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5066

**Figure 55 – Class diagram ExtSchedule::ExtIrregularSchedule**

5067

Figure 55: The diagram contains classes related to schedule.



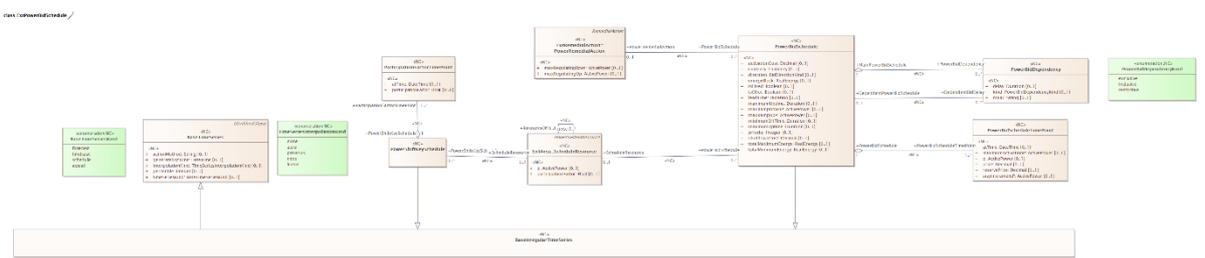
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**Figure 56 – Class diagram ExtSchedule::ExtMustRunSchedule**

5070

Figure 56: The diagram contains classes related to must run schedule.



5071

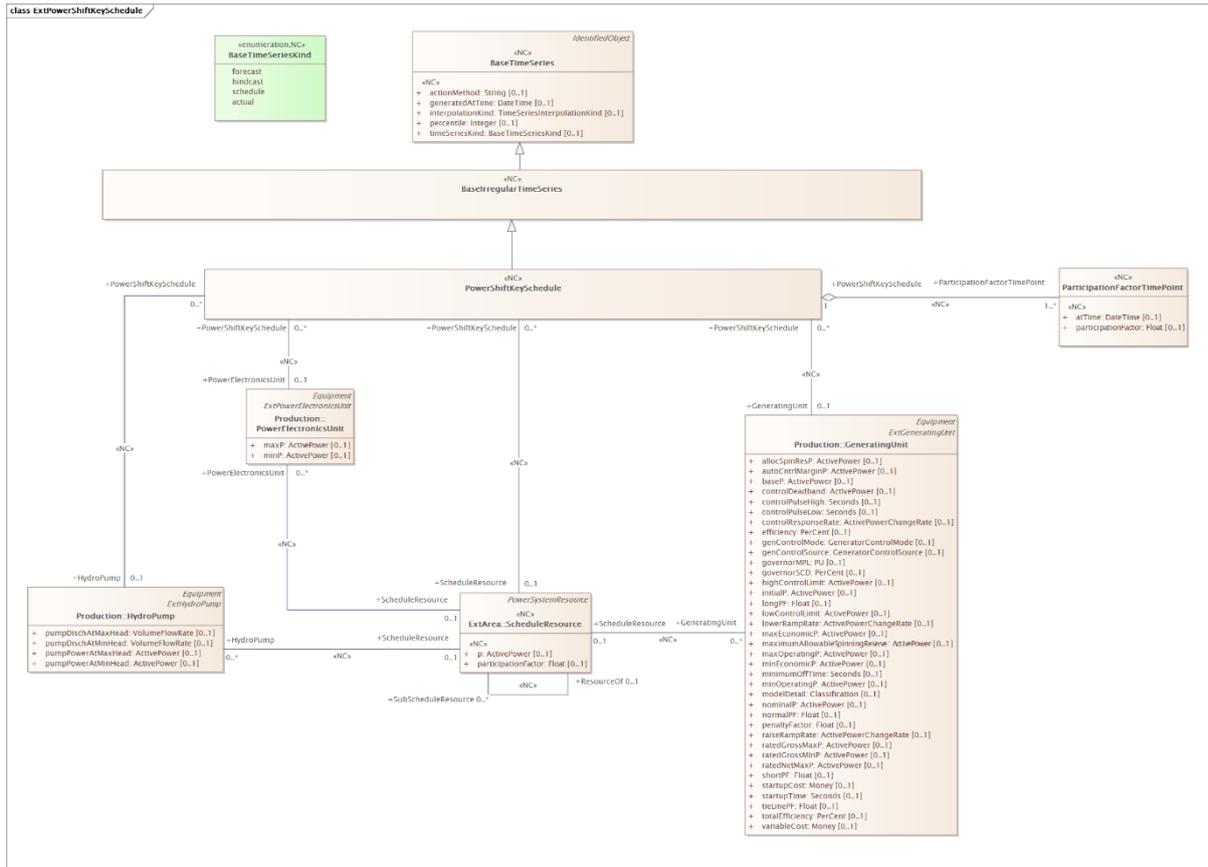
5072

**Figure 57 – Class diagram ExtSchedule::ExtPowerBidSchedule**

5073

Figure 57: The diagram contains classes related to power bid schedule.





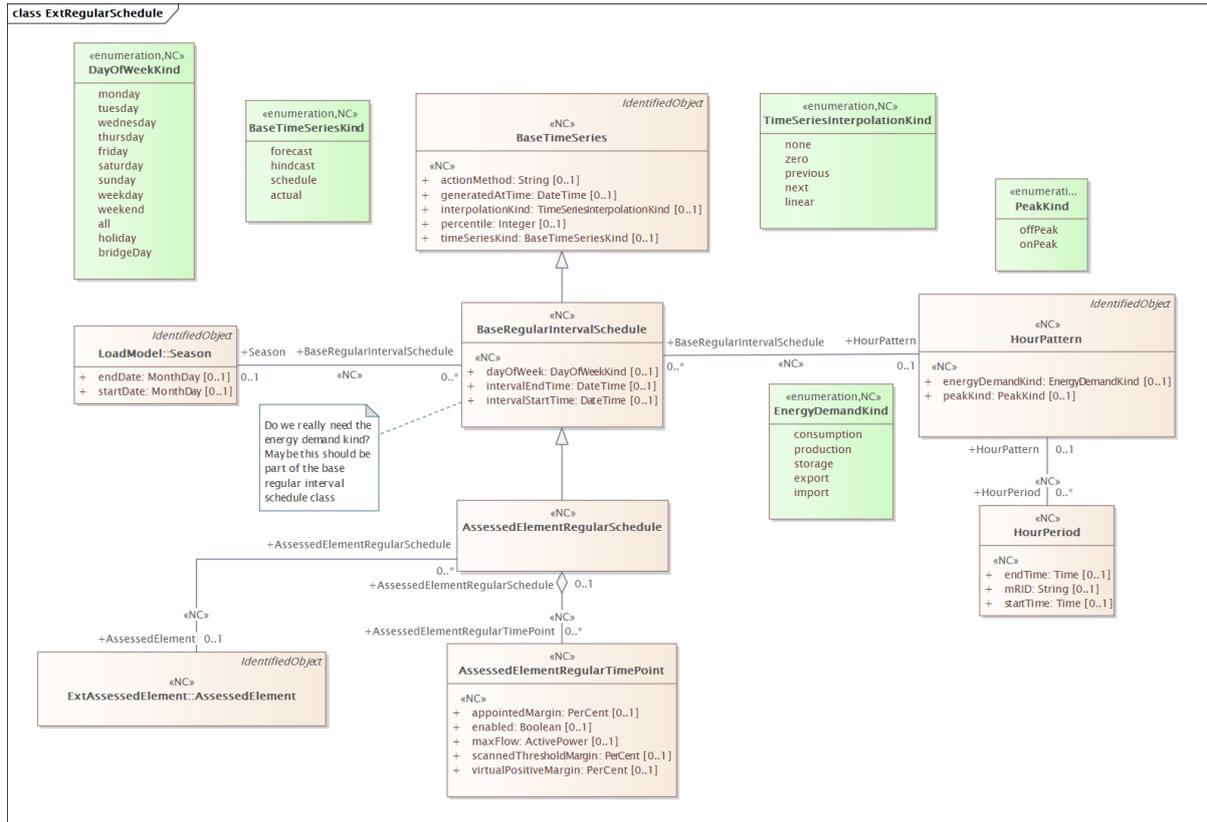
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5078

**Figure 59 – Class diagram ExtSchedule::ExtPowerShiftKeySchedule**

5079

Figure 59: The diagram contains classes related to GLSK schedule.



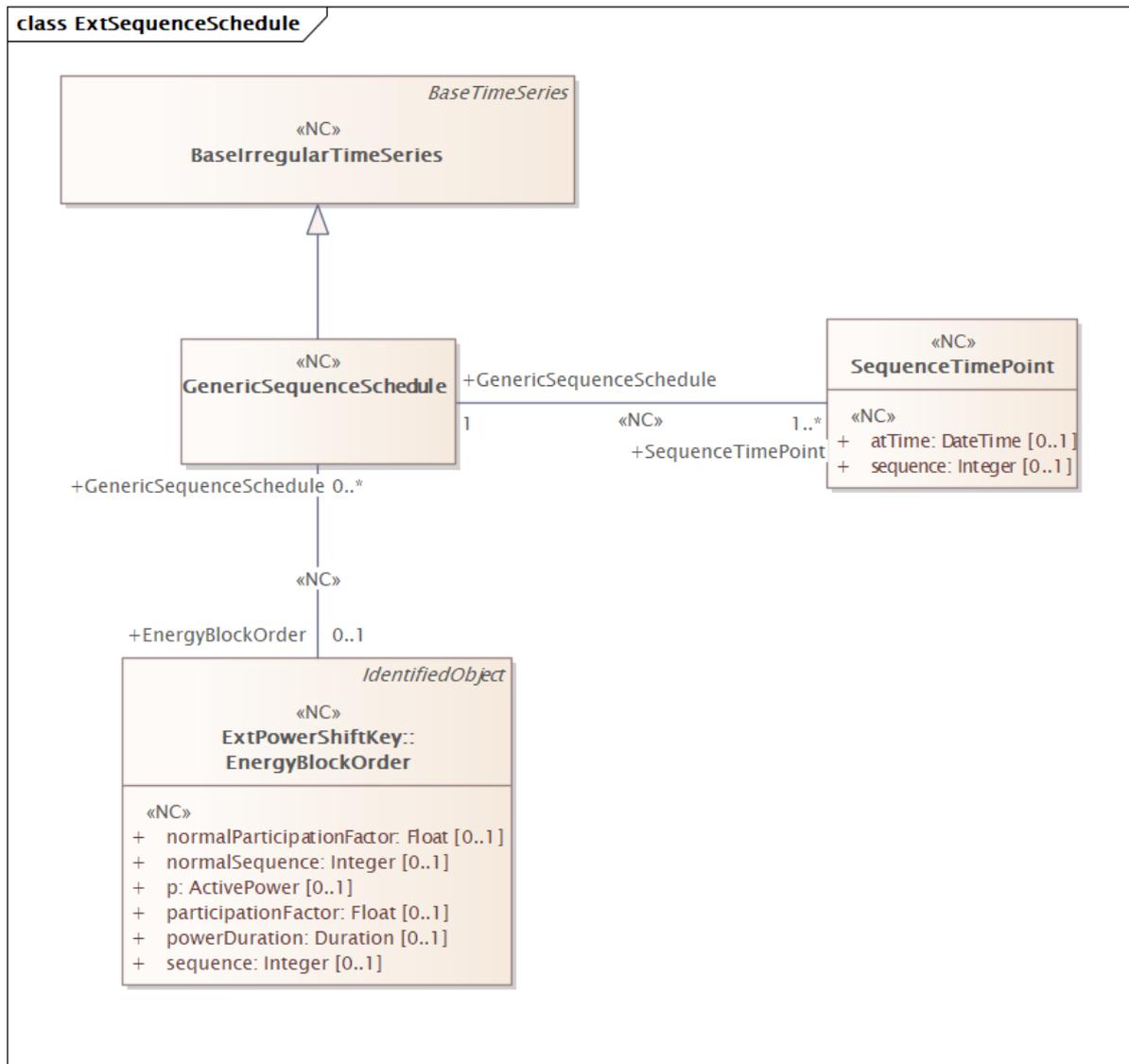
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5081

**Figure 60 – Class diagram ExtSchedule::ExtRegularSchedule**

5082

Figure 60:



5083

5084 **Figure 61 – Class diagram ExtSchedule::ExtSequenceSchedule**

5085 Figure 61: The diagram contains classes related to sequence schedule.

5086 **3.19.2 (NC) PowerShiftKeySchedule**

5087 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5088 ExtEulIdentifiedObject

5089 The schedule for Power Shift Keys.

5090 Table 580 shows all attributes of PowerShiftKeySchedule.

5091 **Table 580 – Attributes of ExtSchedule::PowerShiftKeySchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>

name	mult	type	description
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5092

5093

Table 581 shows all association ends of PowerShiftKeySchedule with other classes.

5094

**Table 581 – Association ends of ExtSchedule::PowerShiftKeySchedule with other classes**

5095

mult from	name	mult to	type	description
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) The EnergyConsumer that has a Power Shift Key schedule.
0..*	EnergySource	0..1	EnergySource	(deprecated,NC) The energy source which has a power shift key schedule. The renewable resources should be modelled as PowerElectronicsUnit.
0..*	ExternalNetworkInjection	0..1	ExternalNetworkInjection	(NC) The energy source which has a power shift key schedule.
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) The Generating Unit which has a Power Shift Key Schedule.
0..*	HydroPump	0..1	HydroPump	(NC) The Hydro Pump which has a Power Shift Key schedule.
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) The Power Electronics Unit which has a Power Shift Key schedule.
0..*	EquivalentInjection	0..1	EquivalentInjection	(NC) Equivalent injection which is part of a power shift key schedule.
0..*	ScheduleResource	0..1	<a href="#">ScheduleResource</a>	(NC) The Schedule Resource which has a Power Shift Key schedule.
0..*	EnergyBlockOrder	0..1	<a href="#">EnergyBlockOrder</a>	(NC) An energy block order which has a Power Shift Key Schedule.
0..*	EnergyGroup	0..1	<a href="#">EnergyGroup</a>	(NC) The energy group which has a Power Shift Key Schedule.
0..*	DCPole	0..1	<a href="#">DCPole</a>	(NC) A DC Pole which has a Power Shift Key Schedule.
0..1	PowerShiftKeyDistribution	0..1	<a href="#">PowerShiftKeyDistribution</a>	(NC) Power Shift Key distribution for the Power Shift Key schedule.
1..1	ParticipationFactorTimePoint	1..*	<a href="#">ParticipationFactorTimePoint</a>	(NC) The participation factor timepoint for a Power Shift Key schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5096

5097 **3.19.3 (NC) BaselregularTimeSeries**5098 Inheritance path = [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

5099 Time series that has irregular points in time.

5100 Table 582 shows all attributes of BaselregularTimeSeries.

5101 **Table 582 – Attributes of ExtSchedule::BaselregularTimeSeries**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5102

5103 Table 583 shows all association ends of BaselregularTimeSeries with other classes.

5104 **Table 583 – Association ends of ExtSchedule::BaselregularTimeSeries with other classes**

5105

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5106

5107 **3.19.4 (NC) BaseTimeSeries**

5108 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

5109 Time series of values at points in time.

5110 Table 584 shows all attributes of BaseTimeSeries.

5111 **Table 584 – Attributes of ExtSchedule::BaseTimeSeries**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) The time this time series (entity) come to existents and available for use.
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) Kind of interpolation done between time point.
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) Kind of base time series.
actionMethod	0..1	String	(NC) Action method used to create the value. This is used for identification in the case where there is multiple time series for the same validity period and kind.

name	mult	type	description
percentile	0..1	Integer	(NC) The percentile is a number where a certain percentage of scores/ranking/values of a sample fall below that number. This is a way for expressing uncertainty in the number provided.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5112

5113

Table 585 shows all association ends of BaseTimeSeries with other classes.

5114

#### Table 585 – Association ends of ExtSchedule::BaseTimeSeries with other classes

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5115

5116

#### 3.19.5 (NC) EventSchedule

5117

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

5118

5119

Time series represent irregular event described by event points in time.

5120

Table 586 shows all attributes of EventSchedule.

5121

#### Table 586 – Attributes of ExtSchedule::EventSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5122

5123

Table 587 shows all association ends of EventSchedule with other classes.

5124 **Table 587 – Association ends of ExtSchedule::EventSchedule with other classes**

mult from	name	mult to	type	description
0..1	ActualAvailabilitySchedule	0..1	<a href="#">AvailabilitySchedule</a>	(NC) Actual availability schedule that has this irregular interval schedule.
0..1	PlannedAvailabilitySchedule	0..1	<a href="#">AvailabilitySchedule</a>	(NC) Planned availability schedule that has this irregular interval schedule.
0..1	RemedialActionSchedule	0..1	<a href="#">RemedialActionSchedule</a>	Remedial action schedule is the event that is validity for the given time series.
1..1	EventTimePoint	1..*	<a href="#">EventTimePoint</a>	(NC) Value for the point in time.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5125

5126 **3.19.6 (NC) EventTimePoint root class**

5127 Event valid for a given point in time.

5128 Table 588 shows all attributes of EventTimePoint.

5129

**Table 588 – Attributes of ExtSchedule::EventTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
isActive	0..1	Boolean	(NC) True, if the event is occurring (Active) at this time point. Otherwise false.

5130

5131 Table 589 shows all association ends of EventTimePoint with other classes.

5132

**Table 589 – Association ends of ExtSchedule::EventTimePoint with other classes**

mult from	name	mult to	type	description
1..*	EventSchedule	1..1	<a href="#">EventSchedule</a>	(NC) Time series the time point values belongs to.

5133

5134 **3.19.7 (NC) GenericValueSchedule**5135 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

5137 Time series represent irregular generic value at given points in time. The type of value is given by the reference association.

5139 Table 590 shows all attributes of GenericValueSchedule.

5140

**Table 590 – Attributes of ExtSchedule::GenericValueSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>

name	mult	type	description
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5141

5142 Table 591 shows all association ends of GenericValueSchedule with other classes.

5143 **Table 591 – Association ends of ExtSchedule::GenericValueSchedule with other classes**

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	<a href="#">RemedialActionSchedule</a>	(NC) Remedial action schedule which has generic value schedules.
0..*	RangeConstraint	0..1	<a href="#">RangeConstraint</a>	(NC) Range constraint for the generic value schedule.
1..1	GenericValueTimePoint	1..*	<a href="#">GenericValueTimePoint</a>	(NC) Value for the point in time.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5144

5145 **3.19.8 (NC) GenericValueTimePoint root class**

5146 Generic value for a given point in time.

5147 Table 592 shows all attributes of GenericValueTimePoint.

5148 **Table 592 – Attributes of ExtSchedule::GenericValueTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
value	0..1	Float	(NC) The value at the time. The meaning of the value is defined by the derived type of the associated schedule. The value can be integer, float or boolean. In case of boolean 1 equals true and 0 equals false.

5149

5150 Table 593 shows all association ends of GenericValueTimePoint with other classes.

5151 **Table 593 – Association ends of ExtSchedule::GenericValueTimePoint with other classes**

5152

mult from	name	mult to	type	description
1..*	GenericValueSchedule	1..1	<a href="#">GenericValueSchedule</a>	(NC) Time series the time point values belongs to.

5153

5154 **3.19.9 (NC) MustRunSchedule**

5155 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5156 ExtEulIdentifiedObject

5157 Time series represent irregular must-run instruction values at given points in time. This could  
5158 be instruction to a reliability must-run (RMR) generation facility that is necessary to run to meet  
5159 certain operating conditions in order to maintain the security of power systems in a competitive  
5160 environment.

5161 Table 594 shows all attributes of MustRunSchedule.

5162 **Table 594 – Attributes of ExtSchedule::MustRunSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5163

5164 Table 595 shows all association ends of MustRunSchedule with other classes.

5165 **Table 595 – Association ends of ExtSchedule::MustRunSchedule with other classes**

mult from	name	mult to	type	description
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) Generating unit which belongs to the must run schedule.
0..*	DCTieCorridor	0..1	<a href="#">DCTieCorridor</a>	(NC) Hydro pump which belongs to the power schedule.
1..1	MustRunTimePoint	1..*	<a href="#">MustRunTimePoint</a>	(NC) Value for the point in time.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5166

5167 **3.19.10 (NC) MustRunTimePoint root class**

5168 Must-run instruction value at a given point in time.

5169 Table 596 shows all attributes of MustRunTimePoint.

5170 **Table 596 – Attributes of ExtSchedule::MustRunTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.

name	mult	type	description
mustRunP	0..1	ActivePower	(NC) Minimum active power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
mustRunQ	0..1	ReactivePower	(NC) Minimum reactive power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
mustRun	0..1	Boolean	(NC) True, if the must-run instruction is active this time point. Otherwise false.

5171

5172 Table 597 shows all association ends of MustRunTimePoint with other classes.

5173 **Table 597 – Association ends of ExtSchedule::MustRunTimePoint with other classes**

mult from	name	mult to	type	description
1..*	MustRunSchedule	1..1	<a href="#">MustRunSchedule</a>	(NC) Time series the time point values belongs to.

5174

5175 **3.19.11 (NC) PowerSchedule**5176 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5177 ExtEulIdentifiedObject

5178 Time series represent irregular power, active and reactive, values at given points in time.

5179 Constraints:

5180 C:NC:PS:PowerSchedule.direction:dependency:

5181 Mandatory if PowerSchedule.powerScheduleKind equal PowerScheduleKind.meritOrder.

5182 Table 598 shows all attributes of PowerSchedule.

5183 **Table 598 – Attributes of ExtSchedule::PowerSchedule**

name	mult	type	description
direction	0..1	<a href="#">RelativeDirectionKind</a>	(NC) Kind of direction.
powerScheduleKind	0..1	<a href="#">PowerScheduleKind</a>	(NC) Kind of power schedule.
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5184

5185 Table 599 shows all association ends of PowerSchedule with other classes.

5186

**Table 599 – Association ends of ExtSchedule::PowerSchedule with other classes**

mult from	name	mult to	type	description
0..*	EnergyConnection	0..1	EnergyConnection	(NC) The energy connection that has a power schedule.
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) Generating unit which belongs to the power schedule.
0..*	HydroPump	0..1	HydroPump	(NC) Hydro pump which belongs to the power schedule.
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) Power electronics unit which belongs to the power schedule.
0..*	BiddingZone	0..1	<a href="#">BiddingZone</a>	(NC) Bidding zone which has power schedules.
0..*	PowerRemedialAction	0..1	<a href="#">PowerRemedialAction</a>	(NC) Power remedial action which belongs to the Remedial Action Schedule.
0..*	EquivalentInjection	0..1	EquivalentInjection	(NC) Equivalent injection which belongs to the power schedule.
0..*	ScheduleResource	0..1	<a href="#">ScheduleResource</a>	(NC) Schedule resource which has power schedules.
0..*	SchedulingArea	0..1	<a href="#">SchedulingArea</a>	Scheduling area which has power schedules.
0..*	BiddingZoneBorder	0..1	<a href="#">BiddingZoneBorder</a>	(NC) Bidding zone border which belongs to the power schedule.
0..*	DCPole	0..1	<a href="#">DCPole</a>	(NC) DC pole which belongs to the power schedule.
0..*	DCTieCorridor	0..1	<a href="#">DCTieCorridor</a>	(NC) DC tie corridor which belongs to the power schedule.
0..*	AreaDispatchableUnit	0..1	<a href="#">AreaDispatchableUnit</a>	(NC) Area dispatchable unit which belongs to the power schedule.
0..*	EnergyGroup	0..1	<a href="#">EnergyGroup</a>	(NC) Energy group which belongs to a power schedule.
0..1	PowerScheduleAction	0..1	<a href="#">PowerScheduleAction</a>	(NC) Power schedule action which belongs to the power schedule.
1..1	PowerTimePoint	0..*	<a href="#">PowerTimePoint</a>	(NC) Value for the point in time.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5187

**5188 3.19.12 (NC) PowerTimePoint root class**

5189 Power, active and reactive, value at a given point in time.

5190 Constraints:

5191 C:NC:PS:PowerTimePoint.meritOrder:dependency:

5192 Mandatory field in the case of PowerSchedule.kind equals meritOrder.

5193 Table 600 shows all attributes of PowerTimePoint.

5194

**Table 600 – Attributes of ExtSchedule::PowerTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
p	0..1	ActivePower	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.
q	0..1	ReactivePower	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node.
price	0..1	Decimal	(NC) Price for the scheduled active power per unit of active power. e.g. per MW.
activatedP	0..1	ActivePower	(NC) Active power activated as part of redispatch. Negative number means that the value is scheduling down. Positive number means that the value is scheduling up.
activatedPrice	0..1	Decimal	(NC) Price for the activated active power per unit e.g. per MW.
meritOrder	0..1	Integer	(NC) Ranking the energy blocks. Ranking can be based on historical values or other sources. It is required if power schedule is kind merit order.
activatedQ	0..1	ReactivePower	(NC) Reactive power activated as part of redispatch. Negative number means that the value is scheduling down. Positive number means that the value is scheduling up.

5195

5196

Table 601 shows all association ends of PowerTimePoint with other classes.

5197

**Table 601 – Association ends of ExtSchedule::PowerTimePoint with other classes**

mult from	name	mult to	type	description
0..*	PowerSchedule	1..1	<a href="#">PowerSchedule</a>	(NC) Time series the time point values belongs to.

5198

**3.19.13 (NC) BaseTimeSeriesKind enumeration**

Kind of time series.

Table 602 shows all literals of BaseTimeSeriesKind.

5202

**Table 602 – Literals of ExtSchedule::BaseTimeSeriesKind**

literal	value	description
forecast		Time series is forecast data. The values represent the result of scientific predictions based on historical time stamped data.
hindcast		Time series is hindcast data. The value represent probable past (historic) condition given by calculation done using actual values. For instance, determine the among of wind based on the energy produced by wind. However, hindcast is typical the result of a simulated forecasts for historical periods.
schedule		Time series is schedule data. The values represent the result of a committed and plan forecast data that has been through a quality control and could incur penalty when not followed.

literal	value	description
actual		Time series is actual data. The values represent measured or calculated values that represent the actual behaviour.

5203

5204 **3.19.14 (NC) TimeSeriesInterpolationKind enumeration**

5205 Kinds of interpolation of values between two time point.

5206 Table 603 shows all literals of TimeSeriesInterpolationKind.

5207

**Table 603 – Literals of ExtSchedule::TimeSeriesInterpolationKind**

literal	value	description
none		No interpolation is applied.
zero		The value between two time points is set to zero.
previous		The value between two time points is set to previous value.
next		The value between two time points is set to next value.
linear		Linear interpolation is applied for values between two time points.

5208

5209 **3.19.15 (NC) ParticipationFactorTimePoint root class**

5210 Participation factor for a given point in time.

5211 Table 604 shows all attributes of ParticipationFactorTimePoint.

5212

**Table 604 – Attributes of ExtSchedule::ParticipationFactorTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
participationFactor	0..1	Float	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.  In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ .  In the case of priority strategy, the item with the lowest number gets allocated energy first.

5213

5214 Table 605 shows all association ends of ParticipationFactorTimePoint with other classes.

**Table 605 – Association ends of ExtSchedule::ParticipationFactorTimePoint with other classes**

mult from	name	mult to	type	description
1..*	PowerShiftKeySchedule	1..1	<a href="#">PowerShiftKeySchedule</a>	(NC) The Power Shift Key schedule which belongs to the participation factor timepoint.

5217

5218 **3.19.16 (NC) CapacitySchedule**5219 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5220 ExtEulIdentifiedObject

5221 The schedule for the capacity.

5222 Table 606 shows all attributes of CapacitySchedule.

5223 **Table 606 – Attributes of ExtSchedule::CapacitySchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5224

5225 Table 607 shows all association ends of CapacitySchedule with other classes.

5226 **Table 607 – Association ends of ExtSchedule::CapacitySchedule with other classes**

mult from	name	mult to	type	description
0..*	BiddingZone	0..1	<a href="#">BiddingZone</a>	(NC) Bidding zone which is referred by the capacity schedule.
1..1	CapacityTimePoint	1..*	<a href="#">CapacityTimePoint</a>	(NC) The capacity timepoint for a capacity schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5227

5228 **3.19.17 (NC) CapacityTimePoint root class**

5229 Capacity instruction value at a given point in time.

5230 Table 608 shows all attributes of CapacityTimePoint.

5231 **Table 608 – Attributes of ExtSchedule::CapacityTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
maxAllocatedP	0..1	ActivePower	(NC) The maximum active power that can be imported to the bidding zone. Load sign convention is used, i.e. negative number means an import, positive number means an export.

name	mult	type	description
minAllocatedP	0..1	ActivePower	(NC) The minimum active power that can be imported to the bidding zone. Load sign convention is used, i.e. negative number means an import, positive number means an export.
maxP	0..1	ActivePower	(NC) Maximum active power.
minP	0..1	ActivePower	(NC) Minimum active power.
maxAllocatedQ	0..1	ReactivePower	(NC) The maximum reactive power that can be imported to the bidding zone. Load sign convention is used, i.e. negative number means an import, positive number means an export.
minAllocatedQ	0..1	ActivePower	(NC) The minimum reactive power that can be imported to the bidding zone. Load sign convention is used, i.e. negative number means an import, positive number means an export.
maxQ	0..1	ActivePower	(NC) Maximum reactive power.
minQ	0..1	ActivePower	(NC) Minimum reactive power.

5232

5233

Table 609 shows all association ends of CapacityTimePoint with other classes.

5234

**Table 609 – Association ends of ExtSchedule::CapacityTimePoint with other classes**

mult from	name	mult to	type	description
1..*	CapacitySchedule	1..1	<a href="#">CapacitySchedule</a>	(NC) The capacity schedule which belongs to the capacity timepoint.

5235

5236

### 3.19.18 (NC) CostVolumePotentialSchedule

5237

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5238

ExtEulIdentifiedObject

5239

The schedule for the cost volume potential.

5240

Table 610 shows all attributes of CostVolumePotentialSchedule.

5241

**Table 610 – Attributes of ExtSchedule::CostVolumePotentialSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5242

5243

Table 611 shows all association ends of CostVolumePotentialSchedule with other classes.

5244 **Table 611 – Association ends of ExtSchedule::CostVolumePotentialSchedule with other**  
5245 **classes**

mult from	name	mult to	type	description
1..1	CostVolumePotentialTimePoint	1..*	<a href="#">CostVolumePotentialTimePoint</a>	(NC) The time point that relates to this cost volume potential schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5246

5247 **3.19.19 (NC) CostVolumePotentialTimePoint root class**

5248 Cost volume potential value at a given point in time.

5249 Table 612 shows all attributes of CostVolumePotentialTimePoint.

5250 **Table 612 – Attributes of ExtSchedule::CostVolumePotentialTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
p	0..1	ActivePower	(NC) The maximum active power that can be imported to the bidding zone. Load sign convention is used, i.e. negative number means an import, positive number means an export.
currency	0..1	Currency	(NC) The maximum reactive power that can be imported to the bidding zone. Load sign convention is used, i.e. negative number means an import, positive number means an export.
price	0..1	Decimal	(NC) Maximum active power.

5251

5252 Table 613 shows all association ends of CostVolumePotentialTimePoint with other classes.

5253 **Table 613 – Association ends of ExtSchedule::CostVolumePotentialTimePoint with**  
5254 **other classes**

mult from	name	mult to	type	description
1..*	CostVolumePotentialSchedule	1..1	<a href="#">CostVolumePotentialSchedule</a>	(NC) The cost volume potential schedule that has this time point.

5255

5256 **3.19.20 (NC) ContingencySchedule**

5257 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5258 ExtEulIdentifiedObject

5259 The schedule for Contingency.

5260 Table 614 shows all attributes of ContingencySchedule.

5261 **Table 614 – Attributes of ExtSchedule::ContingencySchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>

name	mult	type	description
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5262

5263

Table 615 shows all association ends of ContingencySchedule with other classes.

5264

**Table 615 – Association ends of ExtSchedule::ContingencySchedule with other classes**

mult from	name	mult to	type	description
0..*	Contingency	0..1	Contingency	(NC) Contingency which has a contingency schedule.
1..1	ContingencyTimePoint	1..*	<a href="#">ContingencyTimePoint</a>	(NC) The time point that relates to this contingency schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5265

5266

### 3.19.21 (NC) ContingencyTimePoint root class

5267

Contingency instruction value at a given point in time.

5268

Table 616 shows all attributes of ContingencyTimePoint.

5269

**Table 616 – Attributes of ExtSchedule::ContingencyTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
probability	0..1	PerCent	(NC) Probability of occurrence. The allowed value range is [0,100].
mustStudy	0..1	Boolean	(NC) Set true if must study this contingency.

5270

5271

Table 617 shows all association ends of ContingencyTimePoint with other classes.

5272

**Table 617 – Association ends of ExtSchedule::ContingencyTimePoint with other classes**

mult from	name	mult to	type	description
1..*	ContingencySchedule	1..1	<a href="#">ContingencySchedule</a>	(NC) The contingency schedule that has this time point.

5273

5274 **3.19.22 (NC) AssessedElementSchedule**5275 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5276 ExtEulIdentifiedObject

5277 Schedule for assessed element.

5278 Table 618 shows all attributes of AssessedElementSchedule.

5279 **Table 618 – Attributes of ExtSchedule::AssessedElementSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5280

5281 Table 619 shows all association ends of AssessedElementSchedule with other classes.

5282 **Table 619 – Association ends of ExtSchedule::AssessedElementSchedule with other classes**

5283

mult from	name	mult to	type	description
0..*	AssessedElement	0..1	<a href="#">AssessedElement</a>	(NC) Assessed element which has an assessed element schedule.
1..1	AssessedElementTimePoint	1..*	<a href="#">AssessedElementTimePoint</a>	(NC) The time point that relates to this assessed element schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5284

5285 **3.19.23 (NC) AssessedElementTimePoint root class**

5286 Assessed element instruction value at a given point in time.

5287 Table 620 shows all attributes of AssessedElementTimePoint.

5288 **Table 620 – Attributes of ExtSchedule::AssessedElementTimePoint**

name	mult	type	description
enabled	0..1	Boolean	(NC) It identifies if the assessed element is enabled. True means enabled, False means disabled.
maxFlow	0..1	ActivePower	(NC) Maximum flow on an a conducting equipment or a collection of conducting

name	mult	type	description
			equipment forming a power transfer corridor. For assessed elements that becomes critical due to contingency, this value represents the maximum flow with remedial action taken into consideration.
appointedMargin	0..1	PerCent	(NC) The percentage (appointed to a region) of the remaining margin obtained in the grid model to reach its current limit. The maximum percentage shall by default be 10% of the remaining margin.  It is only used when an assessed element is considered conservative for a region. The allowed value range is [0,100].
atTime	0..1	DateTime	(NC) The time the data is valid for.
virtualPositiveMargin	0..1	PerCent	(NC) A margin defined only for scanned AssessedElement (If AssessedElement.ScannedForRegion is present) in order to represent the influence of available remedial action which is not cross-border relevant remedial action.  The margin is modifying the limits used for the assessment whatever the limit it is (e.g. PATL, TATL). This symbolizes a remedial action that can be applied internally by the System Operator. It will be resolved by the System Operator and not by the optimization of remedial actions. The attribute shall be a positive value. The allowed value range is [0,100].
scannedThresholdMargin	0..1	PerCent	(NC) Threshold percentage that a scanned element can be overloaded, on a given element, on top of any overload prior to optimisation (default= 5%). e.g. Initial loading of the element is 110%, with a 5% scanned threshold margin, the new maximum is 115% of the limit (e.g. PATL, TATL, etc). The allowed value range is [0,100].
exclusionReason	0..1	<a href="#">SecuredExclusionReasonKind</a>	(NC) Reason for not associating this assessed element with a secured region.
individualValidationAdjustment	0..1	ActivePower	(NC) A positive value expressed in MW, calculated and provided by System Operators from their individual validation process for the reduction of Remaining Available Margin in order to ensure grid security.
coordinatedValidationAdjustment	0..1	ActivePower	(NC) A positive value expressed in MW, calculated and provided by the coordinated capacity calculator (CCC) for the reduction of Remaining Available Margin (RAM) in order to ensure grid security.
individualValidationAdjustmentShare	0..1	ActivePower	(NC) A positive value expressed in MW, calculated by the coordinated capacity calculator (CCC) based on the provided Individual Validation Adjustment (IVA) by System Operators in order to show the actual reduction of Remaining Available Margin (RAM). Individual Validation Adjustment Share is a positive non-zero value. It is equal or less than the Individual Validation Adjustment value.
individualValidationAdjustmentJustification	0..1	String	(NC) A text description provided by System Operators for justifying the reduction of Remaining Available Margin (RAM) by means of Individual Validation Adjustment (IVA). This justification is not intended for any application

name	mult	type	description
			processing purpose, it should only be used for reporting.
coordinatedValidationAdjustmentJustification	0..1	String	(NC) A text description provided by the coordinated capacity calculator (CCC) for justifying the reduction of Remaining Available Margin (RAM) by means of Coordinated Validation Adjustment (CVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
criticalElementContingencyJustification	0..1	String	(NC) Justification indicating the kind of critical element contingency. This justification is not intended for any application processing purpose, it should only be used for reporting.
targetRemainingAvailableMarginJustification	0..1	String	(NC) Justification indicating the target remaining available margin. This justification is not intended for any application processing purpose, it should only be used for reporting.

5289

5290 Table 621 shows all association ends of AssessedElementTimePoint with other classes.

5291 **Table 621 – Association ends of ExtSchedule::AssessedElementTimePoint with other**  
5292 **classes**

mult from	name	mult to	type	description
1..*	AssessedElementSchedule	1..1	<a href="#">AssessedElementSchedule</a>	(NC) The assessed element schedule that has this time point.

5293

5294 **3.19.24 (NC) PowerBidScheduleTimePoint root class**

5295 Time series represent irregular power, active and reactive, values at given points in time.

5296 Table 622 shows all attributes of PowerBidScheduleTimePoint.

5297 **Table 622 – Attributes of ExtSchedule::PowerBidScheduleTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
price	0..1	Decimal	(NC) Quantity given in the time points.
p	0..1	ActivePower	(NC) Active power given in the time point.
minimumActivationP	0..1	ActivePower	(NC) Minimum active power given in the time point.
reservePrice	0..1	Decimal	(NC) Price for reserving the step increment active power.
stepIncrementP	0..1	ActivePower	(NC) The minimum increment that can be applied for an increase in an activation request.

5298

5299 Table 623 shows all association ends of PowerBidScheduleTimePoint with other classes.

5300 **Table 623 – Association ends of ExtSchedule::PowerBidScheduleTimePoint with other**  
5301 **classes**

mult from	name	mult to	type	description
1..*	PowerBidSchedule	1..1	<a href="#">PowerBidSchedule</a>	(NC) Power bid schedule that has many power bid schedule time points.

5302

5303 **3.19.25 (NC) PowerBidSchedule**5304 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5305 ExtEulIdentifiedObject5306 Power bid or offer related to a redispatch or countertrading measures. In the case of market  
5307 place for economic efficiency of the bids and offers, this is equivalent to BidTimeSeries class  
5308 in 62325 package.

5309 Table 624 shows all attributes of PowerBidSchedule.

5310

**Table 624 – Attributes of ExtSchedule::PowerBidSchedule**

name	mult	type	description
currency	0..1	Currency	(NC) Currency of the bid.
isOffer	0..1	Boolean	(NC) Indicates if the power bid is an offer or not. True, means that the bid is an offer. False, means that the bid is not an offer.
direction	0..1	<a href="#">BidDirectionKind</a>	(NC) Define the direction of the energy adjustment.
totalMinimumEnergy	0..1	RealEnergy	(NC) Minimum total energy that has to be activated by the bid.
priority	0..1	Integer	(NC) The numeric local priority given to a bid. Lower numeric values will have higher priority.
maximumUptime	0..1	Duration	(NC) Maximum duration the action needs to be remain active after startup.
minimumUptime	0..1	Duration	(NC) Minimum duration the action needs to be remain active after startup.
activationCost	0..1	Decimal	(NC) Cost to activate the bid.
shutdownCost	0..1	Decimal	(NC) Total shutdown cost incurred for all the units involved in the bid. This overrides any cost on the specific unit.
leadTime	0..1	Duration	(NC) Time it takes for the bid to be called upon until it is active.
energyBlock	0..1	RealEnergy	(NC) Maximum total energy that can be activated by the bid.
minimumOffTime	0..1	Duration	(NC) Minimum time interval between activation of the bid involving startup and shutdown. This value overrides any value on the unit.
isFixed	0..1	Boolean	(NC) Indicates if the power bid schedule is fixed, meaning that all the different power bid schedule values need to be taken without changes. e.g. It is a take-it-or-leave-it bid offer.
maxRampUpP	0..1	ActivePower	(NC) Maximum increase of the active power change from one time point to the next.
maxRampDownP	0..1	ActivePower	(NC) Maximum decrease of the active power change from one time point to the next.
totalMaximumEnergy	0..1	RealEnergy	(NC) Maximum total energy that can be activated by the bid.
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5311

5312

Table 625 shows all association ends of PowerBidSchedule with other classes.

5313

**Table 625 – Association ends of ExtSchedule::PowerBidSchedule with other classes**

mult from	name	mult to	type	description
0..*	ScheduleResource	0..1	<a href="#">ScheduleResource</a>	(NC) Schedule resource which has several power bid schedules.
0..*	PowerRemedialAction	0..1	<a href="#">PowerRemedialAction</a>	(NC) Power remedial action for which the bid is given.
0..1	PowerShiftKeyDistribution	0..*	<a href="#">PowerShiftKeyDistribution</a>	(NC) Distribution of the power bid amongst the power shift keys.
0..1	PowerScheduleAction	0..1	<a href="#">PowerScheduleAction</a>	(NC) The power schedule action pointed by the power bid schedule.
1..1	PowerBidScheduleTimePoint	1..*	<a href="#">PowerBidScheduleTimePoint</a>	(NC) Power bid schedule time points which belong to a power bid schedule.
1..1	PowerBidDependency	0..*	<a href="#">PowerBidDependency</a>	(NC) Power bids which depends on main bid.
0..1	DependentBidDelay	0..*	<a href="#">PowerBidDependency</a>	(NC) Bid delay which depends on a main power bid.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5314

5315

**3.19.26 (NC) PowerBidDependency root class**

5316

Dependency between the related power bids.

5317

Table 626 shows all attributes of PowerBidDependency.

5318

**Table 626 – Attributes of ExtSchedule::PowerBidDependency**

name	mult	type	description
kind	0..1	<a href="#">PowerBidDependencyKind</a>	(NC) Type of dependency between bids.
delay	0..1	Duration	(NC) Time delay between activation of the parents until the dependent offer will be available.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID

name	mult	type	description
			or rdf:about attributes that identify CIM object elements.

5319

5320 Table 627 shows all association ends of PowerBidDependency with other classes.

5321 **Table 627 – Association ends of ExtSchedule::PowerBidDependency with other classes**

mult from	name	mult to	type	description
0..*	MainPowerBidSchedule	1..1	<a href="#">PowerBidSchedule</a>	(NC) Main power bid which some dependent power bids.
0..*	DependentPowerBidSchedule	0..1	<a href="#">PowerBidSchedule</a>	(NC) Dependent power bid which has some dependent bid delays.

5322

5323 **3.19.27 (NC) GenericEnablingSchedule**5324 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5325 ExtEulIdentifiedObject

5326 The schedule for the enabling of elements.

5327 Table 628 shows all attributes of GenericEnablingSchedule.

5328 **Table 628 – Attributes of ExtSchedule::GenericEnablingSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5329

5330 Table 629 shows all association ends of GenericEnablingSchedule with other classes.

5331 **Table 629 – Association ends of ExtSchedule::GenericEnablingSchedule with other classes**  
5332

mult from	name	mult to	type	description
0..*	ContingencyWithRemedialAction	0..1	<a href="#">ContingencyWithRemedialAction</a>	(NC) Contingency with remedial action which has enabling schedules.
0..*	PowerTransferCorridor	0..1	<a href="#">PowerTransferCorridor</a>	(NC) Power transfer corridor which has generic enabling schedules.
0..*	AssessedElementWithContingency	0..1	<a href="#">AssessedElementWithContingency</a>	(NC) Assessed element with contingency that has enabling schedules.
0..*	AssessedElementWithRemedialAction	0..1	<a href="#">AssessedElementWithRemedialAction</a>	(NC) Assessed element with remedial action that has enabling schedules.

mult from	name	mult to	type	description
0..*	CrossBorderRelevance	0..1	<a href="#">CrossBorderRelevance</a>	(NC) Cross border relevant that has enabling schedules.
0..*	AutomationFunction	0..1	<a href="#">AutomationFunction</a>	(NC) Automation function which has enabling schedules.
0..*	FunctionBlock	0..1	<a href="#">FunctionBlock</a>	(NC) Function block which has enabling schedules.
0..*	RemedialActionDependency	0..1	<a href="#">RemedialActionDependency</a>	(NC) Remedial action dependency which has enabling schedules.
1..1	EnablingTimePoint	1..*	<a href="#">EnablingTimePoint</a>	(NC) The enabling timepoint for a assessed element with enabling schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5333

5334 **3.19.28 (NC) GenericAvailableSchedule**5335 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5336 ExtEulIdentifiedObject

5337 The schedule for the availability of elements.

5338 Table 630 shows all attributes of GenericAvailableSchedule.

5339

**Table 630 – Attributes of ExtSchedule::GenericAvailableSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5340

5341 Table 631 shows all association ends of GenericAvailableSchedule with other classes.

**Table 631 – Association ends of ExtSchedule::GenericAvailableSchedule with other classes**

5342

mult from	name	mult to	type	description
0..*	RemedialAction	0..1	<a href="#">RemedialAction</a>	(NC) Remedial action which has available schedules.

5343

mult from	name	mult to	type	description
1..1	AvailabilityTimePoint	1..*	<a href="#">AvailabilityTimePoint</a>	(NC) The availability timepoint for an available schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5344

**5345 3.19.29 (NC) EnablingTimePoint root class**

5346 Enabling instruction value at a given point in time.

5347 Table 632 shows all attributes of EnablingTimePoint.

5348

**Table 632 – Attributes of ExtSchedule::EnablingTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
enabled	0..1	Boolean	(NC) It identifies if the element is enabled. True means enabled, False means not enabled.

5349

5350 Table 633 shows all association ends of EnablingTimePoint with other classes.

**5351 Table 633 – Association ends of ExtSchedule::EnablingTimePoint with other classes**

mult from	name	mult to	type	description
1..*	GenericEnablingSchedule	1..1	<a href="#">GenericEnablingSchedule</a>	(NC) The enabling schedule which belongs to the enabling timepoint.

5352

**5353 3.19.30 (NC) AvailabilityTimePoint root class**

5354 Availability instruction value at a given point in time.

5355 Table 634 shows all attributes of AvailabilityTimePoint.

5356

**Table 634 – Attributes of ExtSchedule::AvailabilityTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
available	0..1	Boolean	(NC) It identifies if the element is available. True means available, False means unavailable.

5357

5358 Table 635 shows all association ends of AvailabilityTimePoint with other classes.

**5359 Table 635 – Association ends of ExtSchedule::AvailabilityTimePoint with other classes**

mult from	name	mult to	type	description
1..*	GenericAvailabilitySchedule	1..1	<a href="#">GenericAvailableSchedule</a>	(NC) The availability schedule which belongs to the availability timepoint.

5360

**5361 3.19.31 (NC) PowerBidDependencyKind enumeration**

5362 Kind of power bid dependency.

5363 Table 636 shows all literals of PowerBidDependencyKind.

5364

**Table 636 – Literals of ExtSchedule::PowerBidDependencyKind**

literal	value	description
exclusive		Bids are exclusive depending on each other. e.g. Only one of the bids can be activated at the same time.
inclusive		Bids are inclusive depending on each other. e.g. Both bids need to be activated if one of them is activated.
restrictive		Bids are restrictive depending on each other. e.g. You have to take the father bid before you might take the child bid.

5365

5366 **3.19.32 (NC) InfeedLimitSchedule**5367 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5368 ExtEulIdentifiedObject

5369 The schedule for an infeed limit.

5370 Table 637 shows all attributes of InfeedLimitSchedule.

5371

**Table 637 – Attributes of ExtSchedule::InfeedLimitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5372

5373 Table 638 shows all association ends of InfeedLimitSchedule with other classes.

5374

**Table 638 – Association ends of ExtSchedule::InfeedLimitSchedule with other classes**

mult from	name	mult to	type	description
1..1	InfeedLimitTimePoint	1..*	<a href="#">InfeedLimitTimePoint</a>	(NC) The time point that relates to this infeed limit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5375

5376 **3.19.33 (NC) InfeedLimitTimePoint root class**

5377 Infeed limit values at a given point in time.

5378 Table 639 shows all attributes of InfeedLimitTimePoint.

5379 **Table 639 – Attributes of ExtSchedule::InfeedLimitTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
valueW	0..1	ActivePower	(NC) Value of active power limit. The attribute shall be a positive value or zero.
valueA	0..1	CurrentFlow	(NC) Value of current limit. The attribute shall be a positive value or zero.

5380

5381 Table 640 shows all association ends of InfeedLimitTimePoint with other classes.

5382 **Table 640 – Association ends of ExtSchedule::InfeedLimitTimePoint with other classes**

mult from	name	mult to	type	description
1..*	InfeedLimitSchedule	1..1	<a href="#">InfeedLimitSchedule</a>	(NC) The infeed limit schedule that has this time point.

5383

5384 **3.19.34 (NC) PowerRemedialActionSchedule**5385 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5386 ExtEulIdentifiedObject

5387 The schedule for a power remedial action.

5388 Table 641 shows all attributes of PowerRemedialActionSchedule.

5389 **Table 641 – Attributes of ExtSchedule::PowerRemedialActionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5390

5391 Table 642 shows all association ends of PowerRemedialActionSchedule with other classes.

5392 **Table 642 – Association ends of ExtSchedule::PowerRemedialActionSchedule with other classes**  
5393

mult from	name	mult to	type	description
0..*	PowerRemedialAction	0..1	<a href="#">PowerRemedialAction</a>	(NC) Power remedial action for the power remedial action schedule.

mult from	name	mult to	type	description
1..1	PowerRemedialActionTimePoint	1..*	<a href="#">PowerRemedialActionTimePoint</a>	(NC) The time point that relates to this power remedial action schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5394

5395 **3.19.35 (NC) PowerRemedialActionTimePoint root class**

5396 Regulating values at a given point in time.

5397 Table 643 shows all attributes of PowerRemedialActionTimePoint.

5398

**Table 643 – Attributes of ExtSchedule::PowerRemedialActionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
maxRegulatingDown	0..1	ActivePower	(NC) Maximum net amount of active power that the remedial action can regulate down.
maxRegulatingUp	0..1	ActivePower	(NC) Maximum net amount of active power that the remedial action can regulate up.

5399

5400 Table 644 shows all association ends of PowerRemedialActionTimePoint with other classes.

5401 **Table 644 – Association ends of ExtSchedule::PowerRemedialActionTimePoint with other classes**  
5402

mult from	name	mult to	type	description
1..*	PowerRemedialActionSchedule	1..1	<a href="#">PowerRemedialActionSchedule</a>	(NC) The power remedial action schedule that has this time point.

5403

5404 **3.19.36 (NC) UnitCostSchedule**5405 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

5407 The schedule for a unit cost.

5408 Table 645 shows all attributes of UnitCostSchedule.

5409

**Table 645 – Attributes of ExtSchedule::UnitCostSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5410

5411 Table 646 shows all association ends of UnitCostSchedule with other classes.

5412 **Table 646 – Association ends of ExtSchedule::UnitCostSchedule with other classes**

mult from	name	mult to	type	description
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) GeneratingUnit which has unit cost schedules.
1..1	UnitCostTimePoint	1..*	<a href="#">UnitCostTimePoint</a>	(NC) The unit cost time point that relates to this unit cost schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5413

5414 **3.19.37 (NC) UnitCostTimePoint root class**

5415 Unit cost at a given point in time.

5416 Table 647 shows all attributes of UnitCostTimePoint.

5417 **Table 647 – Attributes of ExtSchedule::UnitCostTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
startupCost	0..1	Money	(NC) The initial startup cost incurred for each start of the GeneratingUnit.
warmStartupCost	0..1	Money	(NC) The warm startup cost incurred for each start of the GeneratingUnit.

5418

5419 Table 648 shows all association ends of UnitCostTimePoint with other classes.

5420 **Table 648 – Association ends of ExtSchedule::UnitCostTimePoint with other classes**

mult from	name	mult to	type	description
1..*	UnitCostSchedule	1..1	<a href="#">UnitCostSchedule</a>	(NC) The unit cost schedule that has time point.

5421

5422 **3.19.38 (NC) BaseRegularIntervalSchedule**5423 Inheritance path = [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

5424 Time series that has regular points in time.

5425 Table 649 shows all attributes of BaseRegularIntervalSchedule.

5426

**Table 649 – Attributes of ExtSchedule::BaseRegularIntervalSchedule**

name	mult	type	description
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) Day of the week for which the schedule is valid for.
intervalStartTime	0..1	DateTime	(NC) Interval start time for which the schedule is valid for.
intervalEndTime	0..1	DateTime	(NC) Interval end time for which the schedule is valid for.
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5427

5428

Table 650 shows all association ends of BaseRegularIntervalSchedule with other classes.

5429

5430

**Table 650 – Association ends of ExtSchedule::BaseRegularIntervalSchedule with other classes**

mult from	name	mult to	type	description
0..*	Season	0..1	Season	(NC) Season associated with a base regular interval schedule.
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) HourPattern that has base regular interval schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5431

5432

**3.19.39 (NC) DayOfWeekKind enumeration**

5433

The kind of day to be included in a regular schedule.

5434

Table 651 shows all literals of DayOfWeekKind.

5435

**Table 651 – Literals of ExtSchedule::DayOfWeekKind**

literal	value	description
monday		Monday as the day of the week.
tuesday		Tuesday as the day of the week.
wednesday		Wednesday as the day of the week.

literal	value	description
thursday		Thursday as the day of the week.
friday		Friday as the day of the week.
saturday		Saturday as the day of the week.
sunday		Sunday as the day of the week.
weekday		A day of the week other than Sunday or Saturday.
weekend		A day of the week which is Sunday or Saturday.
all		All days of the week.
holiday		
bridgeDay		A day that is a gap between two distinguished days e.g holiday and weekend that leads to an abnormal scheduling behavior. e.g. if Ascension day falls on a Thursday, then Friday would be a bridge day due to the schedule will not have a normal Friday consumption and production.

5436

5437 **3.19.40 (NC) HourPattern**

5438 Inheritance path = IdentifiedObject : ExtEulIdentifiedObject

5439 Pattern of hourly period in a day with the same kind of intensity.

5440 Table 652 shows all attributes of HourPattern.

5441

**Table 652 – Attributes of ExtSchedule::HourPattern**

name	mult	type	description
peakKind	0..1	<a href="#">PeakKind</a>	(NC) Type of peak or intensity that the pattern is valid for.
energyDemandKind	0..1	<a href="#">EnergyDemandKind</a>	(NC) Type of energy demand that the pattern is valid for.
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5442

5443 Table 653 shows all association ends of HourPattern with other classes.

5444 **Table 653 – Association ends of ExtSchedule::HourPattern with other classes**

mult from	name	mult to	type	description
0..1	BaseRegularIntervalSchedule	0..*	<a href="#">BaseRegularIntervalSchedule</a>	(NC) Base regular interval schedule which belongs to an hour pattern.
0..1	HourPeriod	0..*	<a href="#">HourPeriod</a>	(NC) Hour period which belongs to an hour pattern.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5445

5446 **3.19.41 (NC) PeakKind enumeration**

5447 Kind of time period with similar intensity.

5448 Table 654 shows all literals of PeakKind.

5449

**Table 654 – Literals of ExtSchedule::PeakKind**

literal	value	description
offPeak		Off-peak refer to periods of lower demand for a particular service or commodity.
onPeak		Off-peak refer to periods of higher demand for a particular service or commodity.

5450

5451 **3.19.42 (NC) EnergyDemandKind enumeration**

5452 Kind of energy demand.

5453 Table 655 shows all literals of EnergyDemandKind.

5454

**Table 655 – Literals of ExtSchedule::EnergyDemandKind**

literal	value	description
consumption		
production		
storage		
export		
import		

5455

5456 **3.19.43 (NC) HourPeriod root class**

5457 Period of hours in a day.

5458 Table 656 shows all attributes of HourPeriod.

5459

**Table 656 – Attributes of ExtSchedule::HourPeriod**

name	mult	type	description
startTime	0..1	Time	(NC) Time the period start and including, e.g. 12:00 which means it include the time of 12:00.
endTime	0..1	Time	(NC) Time the period end and not including, e.g. 13:00 which means it does not include the time of 13:00 but 12:59.
mRID	0..1	String	(NC) 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, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

5460

5461 Table 657 shows all association ends of HourPeriod with other classes.

5462

**Table 657 – Association ends of ExtSchedule::HourPeriod with other classes**

mult from	name	mult to	type	description
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) HourPattern which has some hour periods.

5463

**5464 3.19.44 (NC) AssessedElementRegularSchedule**

5465 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :

5466 ExtEulIdentifiedObject

5467 Regular schedule for assessed element.

5468 Table 658 shows all attributes of AssessedElementRegularSchedule.

5469

**Table 658 – Attributes of ExtSchedule::AssessedElementRegularSchedule**

name	mult	type	description
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5470

5471 Table 659 shows all association ends of AssessedElementRegularSchedule with other classes.

5472

**Table 659 – Association ends of ExtSchedule::AssessedElementRegularSchedule with other classes**

5473

mult from	name	mult to	type	description
0..*	AssessedElement	0..1	<a href="#">AssessedElement</a>	(NC) Assessed Element that has regular schedules.
0..1	AssessedElementRegularTimePoint	0..*	<a href="#">AssessedElementRegularTimePoint</a>	(NC) Assessed element regular time point which belong to an assessed element regular schedule.
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

mult from	name	mult to	type	description
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5474

5475 **3.19.45 (NC) AssessedElementRegularTimePoint root class**

5476 Assessed element instruction value at a given point in time.

5477 Table 660 shows all attributes of AssessedElementRegularTimePoint.

5478 **Table 660 – Attributes of ExtSchedule::AssessedElementRegularTimePoint**

name	mult	type	description
appointedMargin	0..1	PerCent	(NC) The percentage (appointed to a region) of the remaining margin obtained in the grid model to reach its current limit. The maximum percentage shall by default be 10% of the remaining margin. It is only used when an assessed element is considered conservative for a region. The allowed value range is [0,100].
maxFlow	0..1	ActivePower	(NC) Maximum flow on an a conducting equipment or a collection of conducting equipment forming a power transfer corridor. For assessed elements that is becomes critical due to contingency, this value represents the maximum flow with remedial action taken into consideration.
enabled	0..1	Boolean	(NC) It identifies if the assessed element is enabled. True means enabled, False means disabled.
virtualPositiveMargin	0..1	PerCent	(NC) A margin defined only for scanned AssessedElement (If AssessedElement.ScannedForRegion is present) in order to represent the influence of available remedial action which is not cross-border relevant remedial action. The margin is modifying the limits used for the assessment whatever the limit it is (e.g. PATL, TATL). This symbolizes a remedial action that can be applied internally by the System Operator. It will be resolved by the System Operator and not by the optimization of remedial actions. The attribute shall be a positive value. The allowed value range is [0,100].
scannedThresholdMargin	0..1	PerCent	(NC) Threshold percentage that a scanned element can be overloaded, on a given element, on top of any overload prior to optimisation (default= 5%). e.g. Initial loading of the element is 110%, with a 5% scanned threshold margin, the new maximum is 115% of the limit (e.g. PATL, TATL, etc). The allowed value range is [0,100].

5479

5480 Table 661 shows all association ends of AssessedElementRegularTimePoint with other classes.

5481 **Table 661 – Association ends of ExtSchedule::AssessedElementRegularTimePoint with**  
5482 **other classes**

mult from	name	mult to	type	description
0..*	AssessedElementRegularSchedule	0..1	<a href="#">AssessedElementRegularSchedule</a>	(NC) Assessed element regular schedule which has assessed element regular time points.

5483

5484 **3.19.46 (NC) VoltageAngleSchedule**

5485 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5486 ExtEulIdentifiedObject

5487 The schedule for a voltage angle.

5488 Table 662 shows all attributes of VoltageAngleSchedule.

5489 **Table 662 – Attributes of ExtSchedule::VoltageAngleSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5490

5491 Table 663 shows all association ends of VoltageAngleSchedule with other classes.

5492 **Table 663 – Association ends of ExtSchedule::VoltageAngleSchedule with other classes**

mult from	name	mult to	type	description
0..*	VoltageAngleLimit	0..1	<a href="#">VoltageAngleLimit</a>	(NC) Voltage angle limit which has voltage angle schedules.
1..1	VoltageAngleTimePoint	1..*	<a href="#">VoltageAngleTimePoint</a>	(NC) The voltage angle time point that relates to this voltage angle schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5493

5494 **3.19.47 (NC) VoltageAngleTimePoint root class**

5495 Voltage angle at a given point in time.

5496 Table 664 shows all attributes of VoltageAngleTimePoint.

5497

**Table 664 – Attributes of ExtSchedule::VoltageAngleTimePoint**

name	mult	type	description
value	0..1	AngleDegrees	(NC) The difference in angle degrees between referenced by the association end OperationalLimitSet.Terminal and the Terminal referenced by the association end VoltageAngleLimit.AngleReferenceTerminal. The value shall be positive (greater than zero).
atTime	0..1	DateTime	(NC) The time the data is valid for.

5498

5499

Table 665 shows all association ends of VoltageAngleTimePoint with other classes.

5500

5501

**Table 665 – Association ends of ExtSchedule::VoltageAngleTimePoint with other classes**

mult from	name	mult to	type	description
1..*	VoltageAngleSchedule	1..1	<a href="#">VoltageAngleSchedule</a>	(NC) The voltage angle schedule that has time point.

5502

5503

**3.19.48 (NC) PowerScheduleKind enumeration**

5504

Kind of power schedule.

5505

Table 666 shows all literals of PowerScheduleKind.

5506

**Table 666 – Literals of ExtSchedule::PowerScheduleKind**

literal	value	description
meritOrder		Power schedule is a merit order that includes ranking of the power block. Power block provides the maximum power allocation possible.
mustRun		Power schedule is a must run schedule that identifies the unit that must run for a given time point.
power		Power schedule that has no additional meaning than allocating power to unit for a given time point.
price		Power schedule includes prices for a given a power per time point.

5507

5508

**3.19.49 (NC) InfeedLimitSchedule**

5509

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5510

ExtEulIdentifiedObject

5511

The schedule for an infeed limit.

5512

Table 667 shows all attributes of InfeedLimitSchedule.

5513

**Table 667 – Attributes of ExtSchedule::InfeedLimitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5514

5515 Table 668 shows all association ends of InfeedLimitSchedule with other classes.

5516 **Table 668 – Association ends of ExtSchedule::InfeedLimitSchedule with other classes**

mult from	name	mult to	type	description
0..*	InfeedLimit	0..1	<a href="#">InfeedLimit</a>	(NC) Infeed limit which has infeed limit schedules.
1..1	InfeedLimitTimePoint	1..*	<a href="#">InfeedLimitTimePoint</a>	(NC) Infeed limit time point that relates to this voltage angle schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5517

5518 **3.19.50 (NC) InfeedLimitTimePoint root class**

5519 Infeed limit at a given point in time.

5520 Table 669 shows all attributes of InfeedLimitTimePoint.

5521 **Table 669 – Attributes of ExtSchedule::InfeedLimitTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
valueW	0..1	ActivePower	(NC) Value of active power limit. The attribute shall be a positive value or zero.
valueA	0..1	CurrentFlow	(NC) Value of current limit. The attribute shall be a positive value or zero.

5522

5523 Table 670 shows all association ends of InfeedLimitTimePoint with other classes.

5524 **Table 670 – Association ends of ExtSchedule::InfeedLimitTimePoint with other classes**

mult from	name	mult to	type	description
1..*	InfeedLimitSchedule	1..1	<a href="#">InfeedLimitSchedule</a>	(NC) Infeed limit schedule that has time point.

5525

5526 **3.19.51 (NC) RemedialActionSchemeSchedule**5527 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5528 ExtEulIdentifiedObject

5529 The schedule for a remedial action scheme.

5530 Table 671 shows all attributes of RemedialActionSchemeSchedule.

5531

**Table 671 – Attributes of ExtSchedule::RemedialActionSchemeSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5532

5533

Table 672 shows all association ends of RemedialActionSchemeSchedule with other classes.

5534

**Table 672 – Association ends of ExtSchedule::RemedialActionSchemeSchedule with other classes**

5535

mult from	name	mult to	type	description
0..*	ArmedRemedialAction	0..1	<a href="#">RemedialActionScheme</a>	(NC) Armed remedial action for a remedial action scheme.
0..*	SchemeRemedialAction	0..1	<a href="#">SchemeRemedialAction</a>	(NC) Remedial action scheme which has remedial action scheme schedules.
1..1	RemedialActionSchemeTimePoint	1..*	<a href="#">RemedialActionSchemeTimePoint</a>	(NC) Remedial action scheme time point that relates to this remedial action scheme schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5536

5537

**3.19.52 (NC) RemedialActionSchemeTimePoint root class**

5538

Remedial action scheme at a given point in time.

5539

Table 673 shows all attributes of RemedialActionSchemeTimePoint.

5540

**Table 673 – Attributes of ExtSchedule::RemedialActionSchemeTimePoint**

name	mult	type	description
armed	0..1	Boolean	(NC) Defines the arming status of the remedial action scheme. It is set by operation or by signal.
inService	0..1	Boolean	(NC) Specifies the availability of the Remedial Action Scheme (RAS). If true, the RAS is available for contingency processing. If false, the RAS is treated by contingency processing as if it is not in the model.

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.

5541  
5542

Table 674 shows all association ends of RemedialActionSchemeTimePoint with other classes.

5543  
5544

**Table 674 – Association ends of ExtSchedule::RemedialActionSchemeTimePoint with other classes**

mult from	name	mult to	type	description
1..*	RemedialActionSchemeSchedule	1..1	<a href="#">RemedialActionSchemeSchedule</a>	(NC) Remedial action scheme schedule that has time point.

5545

### 5546 3.19.53 (NC) RemedialActionGroupSchedule

5547 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5548 ExtEulIdentifiedObject

5549 The schedule for a remedial action group.

5550 Table 675 shows all attributes of RemedialActionGroupSchedule.

5551 **Table 675 – Attributes of ExtSchedule::RemedialActionGroupSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5552

5553 Table 676 shows all association ends of RemedialActionGroupSchedule with other classes.

5554 **Table 676 – Association ends of ExtSchedule::RemedialActionGroupSchedule with**  
5555 **other classes**

mult from	name	mult to	type	description
0..*	RemedialActionGroup	0..1	<a href="#">RemedialActionGroup</a>	(NC) Remedial action group which has remedial action group schedules.
1..1	RemedialActionGroupTimePoint	1..*	<a href="#">RemedialActionGroupTimePoint</a>	(NC) Remedial action group time point that relates to this remedial action group schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5556

5557 **3.19.54 (NC) RemedialActionGroupTimePoint root class**

5558 Remedial action group at a given point in time.

5559 Table 677 shows all attributes of RemedialActionGroupTimePoint.

5560 **Table 677 – Attributes of ExtSchedule::RemedialActionGroupTimePoint**

name	mult	type	description
maxRegulatingDown	0..1	ActivePower	(NC) Maximum net amount of active power that the group of remedial actions can regulate down.
maxRegulatingUp	0..1	ActivePower	(NC) Maximum net amount of active power that the group of remedial actions can regulate up.
atTime	0..1	DateTime	(NC) The time the data is valid for.

5561

5562 Table 678 shows all association ends of RemedialActionGroupTimePoint with other classes.

5563 **Table 678 – Association ends of ExtSchedule::RemedialActionGroupTimePoint with other classes**

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mult from	name	mult to	type	description
1..*	RemedialActionGroupSchedule	1..1	<a href="#">RemedialActionGroupSchedule</a>	(NC) Remedial action group schedule that has time point.

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5566 **3.19.55 (NC) GridStateAlterationSchedule**5567 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

5568 Schedule for a grid state alteration.

5570 Table 679 shows all attributes of GridStateAlterationSchedule.

5571 **Table 679 – Attributes of ExtSchedule::GridStateAlterationSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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5573 Table 680 shows all association ends of GridStateAlterationSchedule with other classes.

5574 **Table 680 – Association ends of ExtSchedule::GridStateAlterationSchedule with other**  
5575 **classes**

mult from	name	mult to	type	description
0..*	GridStateAlteration	0..1	<a href="#">GridStateAlteration</a>	(NC) Grid state alteration which has grid state alteration schedules.
1..1	GridStateAlterationTime Point	1..*	<a href="#">GridStateAlterationTime Point</a>	(NC) Grid state alteration time point that relates to this grid state alteration schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5576

5577 **3.19.56 (NC) GridStateAlterationTimePoint root class**

5578 Grid state alteration at a given point in time.

5579 Table 681 shows all attributes of GridStateAlterationTimePoint.

5580 **Table 681 – Attributes of ExtSchedule::GridStateAlterationTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
enabled	0..1	Boolean	(NC) The status of the GridStateAlteration set by an operation or by a signal resulting from a control action.
participationFactor	0..1	PerCent	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value.  In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. $V=T/\text{sum}(PF)$ .  In the case of priority strategy, the item with the lowest number gets allocated energy first.  e.g. If 0 this grid alteration does not participate. The sum of all participation factors for all grid state alterations associated with same remedial action shall be equal to 100%.

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5582 Table 682 shows all association ends of GridStateAlterationTimePoint with other classes.

5583 **Table 682 – Association ends of ExtSchedule::GridStateAlterationTimePoint with other**  
5584 **classes**

mult from	name	mult to	type	description
1..*	GridStateAlterationSchedule	1..1	<a href="#">GridStateAlterationSchedule</a>	(NC) Grid state alteration schedule that has time point.

5585

5586 **3.19.57 (NC) RegulatingControlRegularSchedule**5587 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5588 ExtEulIdentifiedObject

5589 Regular schedule for regulating control.

5590 Table 683 shows all attributes of RegulatingControlRegularSchedule.

5591 **Table 683 – Attributes of ExtSchedule::RegulatingControlRegularSchedule**

name	mult	type	description
discrete	1..1	NullCIM	(NC) The regulation is performed in a discrete mode. This applies to equipment with discrete controls, e.g. tap changers and shunt compensators.
enabled	1..1	NullCIM	(NC) The flag tells if regulation is enabled.
targetDeadband	0..1	NullCIM	(NC) This is a deadband used with discrete control to avoid excessive update of controls like tap changers and shunt compensator banks while regulating. The units of those appropriate for the mode. The attribute shall be a positive value or zero. If RegulatingControl.discrete is set to "false", the RegulatingControl.targetDeadband is to be ignored.  Note that for instance, if the targetValue is 100 kV and the targetDeadband is 2 kV the range is from 99 to 101 kV.
targetValue	1..1	NullCIM	(NC) The target value specified for case input. This value can be used for the target value without the use of schedules. The value has the units appropriate to the mode attribute.
targetValueUnitMultiplier	1..1	NullCIM	(NC) Specify the multiplier for used for the targetValue.
maxAllowedTargetValue	0..1	NullCIM	(NC) Maximum allowed target value (RegulatingControl.targetValue).
minAllowedTargetValue	0..1	NullCIM	(NC) Minimum allowed target value (RegulatingControl.targetValue).
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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5593 Table 684 shows all association ends of RegulatingControlRegularSchedule with other classes.

5594 **Table 684 – Association ends of ExtSchedule::RegulatingControlRegularSchedule with**  
5595 **other classes**

mult from	name	mult to	type	description
0..*	RegulatingControl	0..1	RegulatingControl	(NC) Regulating control which has RegulatingControlRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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5597 **3.19.58 (NC) TapChangerControlRegularSchedule**

5598 Inheritance path = [RegulatingControlRegularSchedule](#) : [BaseRegularIntervalSchedule](#) :  
5599 [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

5600 Regular schedule for tap changer control.

5601 Table 685 shows all attributes of TapChangerControlRegularSchedule.

5602 **Table 685 – Attributes of ExtSchedule::TapChangerControlRegularSchedule**

name	mult	type	description
discrete	1..1	NullCIM	(NC) inherited from: <a href="#">RegulatingControlRegularSchedule</a>
enabled	1..1	NullCIM	(NC) inherited from: <a href="#">RegulatingControlRegularSchedule</a>
targetDeadband	0..1	NullCIM	(NC) inherited from: <a href="#">RegulatingControlRegularSchedule</a>
targetValue	1..1	NullCIM	(NC) inherited from: <a href="#">RegulatingControlRegularSchedule</a>
targetValueUnitMultiplier	1..1	NullCIM	(NC) inherited from: <a href="#">RegulatingControlRegularSchedule</a>
maxAllowedTargetValue	0..1	NullCIM	(NC) inherited from: <a href="#">RegulatingControlRegularSchedule</a>
minAllowedTargetValue	0..1	NullCIM	(NC) inherited from: <a href="#">RegulatingControlRegularSchedule</a>
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>

name	mult	type	description
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 686 shows all association ends of TapChangerControlRegularSchedule with other classes.

**Table 686 – Association ends of ExtSchedule::TapChangerControlRegularSchedule with other classes**

mult from	name	mult to	type	description
0..*	TapChangerControl	0..1	TapChangerControl	(NC) Tap changer control which has TapChangerControlRegularSchedule.
0..*	RegulatingControl	0..1	RegulatingControl	(NC) inherited from: <a href="#">RegulatingControlRegularSchedule</a>
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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### 3.19.59 (NC) TapRegularSchedule

Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject  
Regular schedule for tap.

Table 687 shows all attributes of TapRegularSchedule.

**Table 687 – Attributes of ExtSchedule::TapRegularSchedule**

name	mult	type	description
controlEnabled	1..1	NullCIM	(NC) Specifies the regulation status of the equipment. True is regulating, false is not regulating.
step	1..1	NullCIM	(NC) Tap changer position. Starting step for a steady state solution. Non integer values are allowed to support continuous tap variables. The reasons for continuous value are to support study cases where no discrete tap changer has yet been designed, a solution where a narrow voltage band forces the tap step to

name	mult	type	description
			oscillate or to accommodate for a continuous solution as input. The attribute shall be equal to or greater than lowStep and equal to or less than highStep.
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 688 shows all association ends of TapRegularSchedule with other classes.

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**Table 688 – Association ends of ExtSchedule::TapRegularSchedule with other classes**

mult from	name	mult to	type	description
0..*	TapChanger	0..1	TapChanger	(NC) Tap changer which has TapRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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**3.19.60 (NC) SwitchRegularSchedule**

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Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

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Regular schedule for switch.

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Table 689 shows all attributes of SwitchRegularSchedule.

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**Table 689 – Attributes of ExtSchedule::SwitchRegularSchedule**

name	mult	type	description
open	1..1	NullCIM	(NC) The attribute tells if the switch is considered open when used as input to topology processing.
locked	1..1	NullCIM	(NC) If true, the switch is locked. The resulting switch state is a combination of locked and Switch.open attributes as follows: - locked=true and Switch.open=true. The resulting state is open and locked; - locked=false and Switch.open=true. The resulting state is open; - locked=false and Switch.open=false. The resulting state is closed.
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 690 shows all association ends of SwitchRegularSchedule with other classes.

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**Table 690 – Association ends of ExtSchedule::SwitchRegularSchedule with other classes**

mult from	name	mult to	type	description
0..*	Switch	0..1	Switch	(NC) Switch which has SwitchRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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5630 **3.19.61 (NC) EnergyConnectionRegularSchedule**5631 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5632 ExtEulIdentifiedObject

5633 Regular schedule for energy connection.

5634 Table 691 shows all attributes of EnergyConnectionRegularSchedule.

5635 **Table 691 – Attributes of ExtSchedule::EnergyConnectionRegularSchedule**

name	mult	type	description
p	1..1	NullCIM	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.
q	1..1	NullCIM	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5636

5637 Table 692 shows all association ends of EnergyConnectionRegularSchedule with other classes.

5638 **Table 692 – Association ends of ExtSchedule::EnergyConnectionRegularSchedule with other classes**  
5639

mult from	name	mult to	type	description
0..*	EnergyConnection	0..1	EnergyConnection	(NC) EnergyConnection which has EnergyConnectionSchedule.
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>

mult from	name	mult to	type	description
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5640

5641 **3.19.62 (NC) InServiceRegularSchedule**5642 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5643 ExtEulIdentifiedObject

5644 Regular schedule for elements having in service.

5645 Table 693 shows all attributes of InServiceRegularSchedule.

5646

**Table 693 – Attributes of ExtSchedule::InServiceRegularSchedule**

name	mult	type	description
inService	1..1	NullCIM	(NC) Specifies the availability of the equipment. True means the equipment is available for topology processing, which determines if the equipment is energized or not. False means that the equipment is treated by network applications as if it is not in the model.
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5647

5648 Table 694 shows all association ends of InServiceRegularSchedule with other classes.

5649  
5650**Table 694 – Association ends of ExtSchedule::InServiceRegularSchedule with other classes**

mult from	name	mult to	type	description
0..*	Equipment	0..1	Equipment	(NC) Equipment which has InServiceRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5651

**5652 3.19.63 (NC) ControlAreaRegularSchedule**5653 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5654 ExtEulIdentifiedObject

5655 Regular schedule for control area.

5656 Table 695 shows all attributes of ControlAreaRegularSchedule.

5657

**Table 695 – Attributes of ExtSchedule::ControlAreaRegularSchedule**

name	mult	type	description
netInterchange	1..1	NullCIM	(NC) The specified positive net interchange into the control area, i.e. positive sign means flow into the area.
pTolerance	0..1	NullCIM	(NC) Active power net interchange tolerance. The attribute shall be a positive value or zero.
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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5659 Table 696 shows all association ends of ControlAreaRegularSchedule with other classes.

5660 **Table 696 – Association ends of ExtSchedule::ControlAreaRegularSchedule with other**  
5661 **classes**

mult from	name	mult to	type	description
0..*	ControlArea	0..1	ControlArea	(NC) ControlArea which has ControlAreaRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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5663 **3.19.64 (NC) SynchronousMachineRegularSchedule**

5664 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5665 ExtEulIdentifiedObject

5666 Regular schedule for synchronous machine.

5667 Table 697 shows all attributes of SynchronousMachineRegularSchedule.

5668 **Table 697 – Attributes of ExtSchedule::SynchronousMachineRegularSchedule**

name	mult	type	description
operatingMode	1..1	NullCIM	(NC) Current mode of operation.
referencePriority	1..1	NullCIM	(NC) Priority of unit for use as powerflow voltage phase angle reference bus selection. 0 = don t care (default) 1 = highest priority. 2 is less than 1 and so on.
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5669  
5670 Table 698 shows all association ends of SynchronousMachineRegularSchedule with other  
5671 classes.

5672 **Table 698 – Association ends of ExtSchedule::SynchronousMachineRegularSchedule**  
5673 **with other classes**

mult from	name	mult to	type	description
0..*	SynchronousMachine	0..1	SynchronousMachine	(NC) SynchronousMachine which has SynchronousMachineRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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5675 **3.19.65 (NC) AsynchronousMachineRegularSchedule**

5676 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5677 ExtEulIdentifiedObject

5678 Regular schedule for asynchronous machine.

5679 Table 699 shows all attributes of AsynchronousMachineRegularSchedule.

5680 **Table 699 – Attributes of ExtSchedule::AsynchronousMachineRegularSchedule**

name	mult	type	description
asynchronousMachineType	1..1	NullCIM	(NC) Indicates the type of Asynchronous Machine (motor or generator).
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5681  
5682 Table 700 shows all association ends of AsynchronousMachineRegularSchedule with other  
5683 classes.

5684 **Table 700 – Association ends of ExtSchedule::AsynchronousMachineRegularSchedule**  
5685 **with other classes**

mult from	name	mult to	type	description
0..*	AsynchronousMachine	0..1	AsynchronousMachine	(NC) AsynchronousMachine which has AsynchronousMachineRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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5687 **3.19.66 (NC) ExternalNetworkInjectionRegularSchedule**

5688 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5689 ExtEulIdentifiedObject

5690 Regular schedule for external network injection.

5691 Table 701 shows all attributes of ExternalNetworkInjectionRegularSchedule.

5692 **Table 701 – Attributes of ExtSchedule::ExternalNetworkInjectionRegularSchedule**

name	mult	type	description
referencePriority	1..1	NullCIM	(NC) Priority of unit for use as powerflow voltage phase angle reference bus selection. 0 = don t care (default) 1 = highest priority. 2 is less than 1 and so on.
p	1..1	NullCIM	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.
q	1..1	NullCIM	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>

name	mult	type	description
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 702 shows all association ends of ExternalNetworkInjectionRegularSchedule with other classes.

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**Table 702 – Association ends of  
ExtSchedule::ExternalNetworkInjectionRegularSchedule with other classes**

mult from	name	mult to	type	description
0..*	ExternalNetworkInjection	0..1	ExternalNetworkInjection	(NC) External network injection which has ExternalNetworkInjectionRegularSchedule
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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### 5699 3.19.67 (NC) EquivalentInjectionRegularSchedule

5700 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5701 ExtEulIdentifiedObject

5702 Regular schedule for equivalent injection.

5703 Table 703 shows all attributes of EquivalentInjectionRegularSchedule.

5704

**Table 703 – Attributes of ExtSchedule::EquivalentInjectionRegularSchedule**

name	mult	type	description
regulationStatus	0..1	NullCIM	(NC) Specifies the regulation status of the EquivalentInjection. True is regulating. False is not regulating.
regulationTarget	0..1	NullCIM	(NC) The target voltage for voltage regulation. The attribute shall be a positive value.
p	1..1	NullCIM	(NC) Equivalent active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.
q	1..1	NullCIM	(NC) Equivalent reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node.

name	mult	type	description
			Starting value for steady state solutions.
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 704 shows all association ends of EquivalentInjectionRegularSchedule with other classes.

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**Table 704 – Association ends of ExtSchedule::EquivalentInjectionRegularSchedule with other classes**

mult from	name	mult to	type	description
0..*	EquivalentInjection	0..1	EquivalentInjection	(NC) EquivalentInjection which has EquivalentInjectionRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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### 5711 3.19.68 (NC) ACDCConverterRegularSchedule

5712 Inheritance path = [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5713 ExtEulIdentifiedObject

5714 Regular schedule for ACDC converter.

5715 Table 705 shows all attributes of ACDCConverterRegularSchedule.

5716

**Table 705 – Attributes of ExtSchedule::ACDCConverterRegularSchedule**

name	mult	type	description
p	1..1	NullCIM	(NC) Active power at the point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution in the case a simplified power flow model is used.
q	1..1	NullCIM	(NC) Reactive power at the point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution in the case a simplified power flow model is used.
targetPpcc	0..1	NullCIM	(NC) Real power injection target in AC grid, at point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node.
targetUdc	0..1	NullCIM	(NC) Target value for DC voltage magnitude. The attribute shall be a positive value.
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 706 shows all association ends of ACDCConverterRegularSchedule with other classes.

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**Table 706 – Association ends of ExtSchedule::ACDCConverterRegularSchedule with other classes**

mult from	name	mult to	type	description
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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5722 **3.19.69 (NC) CsConverterRegularSchedule**5723 Inheritance path = [ACDCCConverterRegularSchedule](#) : [BaseRegularIntervalSchedule](#) :5724 [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

5725 Regular schedule for CS converter.

5726 Table 707 shows all attributes of CsConverterRegularSchedule.

5727

**Table 707 – Attributes of ExtSchedule::CsConverterRegularSchedule**

name	mult	type	description
operatingMode	1..1	NullCIM	(NC) Indicates whether the DC pole is operating as an inverter or as a rectifier. It is converter's control variable used in power flow.
pPccControl	1..1	NullCIM	(NC) Kind of active power control.
targetAlpha	0..1	NullCIM	(NC) Target firing angle. It is converter's control variable used in power flow. It is only applicable for rectifier if continuous tap changer control is used. Allowed values are within the range $\text{minAlpha} \leq \text{targetAlpha} \leq \text{maxAlpha}$ . The attribute shall be a positive value.
targetGamma	0..1	NullCIM	(NC) Target extinction angle. It is converter's control variable used in power flow. It is only applicable for inverter if continuous tap changer control is used. Allowed values are within the range $\text{minGamma} \leq \text{targetGamma} \leq \text{maxGamma}$ . The attribute shall be a positive value.
targetIdc	0..1	NullCIM	(NC) DC current target value. It is converter's control variable used in power flow. The attribute shall be a positive value.
p	1..1	NullCIM	(NC) inherited from: <a href="#">ACDCCConverterRegularSchedule</a>
q	1..1	NullCIM	(NC) inherited from: <a href="#">ACDCCConverterRegularSchedule</a>
targetPpcc	0..1	NullCIM	(NC) inherited from: <a href="#">ACDCCConverterRegularSchedule</a>
targetUdc	0..1	NullCIM	(NC) inherited from: <a href="#">ACDCCConverterRegularSchedule</a>
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 708 shows all association ends of CsConverterRegularSchedule with other classes.

**Table 708 – Association ends of ExtSchedule::CsConverterRegularSchedule with other classes**

mult from	name	mult to	type	description
0..*	CsConverter	0..1	CsConverter	(NC) CsConverter which has CsConverterRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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### 3.19.70 (NC) VsConverterRegularSchedule

Inheritance path = [ACDCCConverterRegularSchedule](#) : [BaseRegularIntervalSchedule](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject  
Regular schedule for VS converter.

Table 709 shows all attributes of VsConverterRegularSchedule.

**Table 709 – Attributes of ExtSchedule::VsConverterRegularSchedule**

name	mult	type	description
droop	0..1	NullCIM	(NC) Droop constant. The pu value is obtained as $D [kV/MW] \times S_b / U_{bdc}$ . The attribute shall be a positive value.
droopCompensation	0..1	NullCIM	(NC) Compensation constant. Used to compensate for voltage drop when controlling voltage at a distant bus. The attribute shall be a positive value.
pPccControl	1..1	NullCIM	(NC) Kind of control of real power and/or DC voltage.
qPccControl	1..1	NullCIM	(NC) Kind of reactive power control.
qShare	0..1	NullCIM	(NC) Reactive power sharing factor among parallel converters on Uac control. The attribute shall be a positive value or zero.
targetQpcc	0..1	NullCIM	(NC) Reactive power injection target in AC grid, at point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node.

name	mult	type	description
targetUpcc	0..1	NullCIM	(NC) Voltage target in AC grid, at point of common coupling. The attribute shall be a positive value.
targetPowerFactorPcc	0..1	NullCIM	(NC) Power factor target at the AC side, at point of common coupling. The attribute shall be a positive value.
targetPhasePcc	0..1	NullCIM	(NC) Phase target at AC side, at point of common coupling. The attribute shall be a positive value.
targetPWMfactor	0..1	NullCIM	(NC) Magnitude of pulse-modulation factor. The attribute shall be a positive value.
p	1..1	NullCIM	(NC) inherited from: <a href="#">ACDCConverterRegularSchedule</a>
q	1..1	NullCIM	(NC) inherited from: <a href="#">ACDCConverterRegularSchedule</a>
targetPcc	0..1	NullCIM	(NC) inherited from: <a href="#">ACDCConverterRegularSchedule</a>
targetUdc	0..1	NullCIM	(NC) inherited from: <a href="#">ACDCConverterRegularSchedule</a>
dayOfWeek	0..1	<a href="#">DayOfWeekKind</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalStartTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
intervalEndTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 710 shows all association ends of VsConverterRegularSchedule with other classes.

**Table 710 – Association ends of ExtSchedule::VsConverterRegularSchedule with other classes**

mult from	name	mult to	type	description
0..*	VsConverter	0..1	VsConverter	(NC) VsConverter which has VsConverterRegularSchedule.
0..*	Season	0..1	Season	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>
0..*	HourPattern	0..1	<a href="#">HourPattern</a>	(NC) inherited from: <a href="#">BaseRegularIntervalSchedule</a>

mult from	name	mult to	type	description
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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5744 **3.19.71 (NC) EquivalentInjectionSchedule**5745 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5746 ExtEulIdentifiedObject

5747 Regular schedule for equivalent injection.

5748 Table 711 shows all attributes of EquivalentInjectionSchedule.

5749

**Table 711 – Attributes of ExtSchedule::EquivalentInjectionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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5751 Table 712 shows all association ends of EquivalentInjectionSchedule with other classes.

**Table 712 – Association ends of ExtSchedule::EquivalentInjectionSchedule with other classes**

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mult from	name	mult to	type	description
0..*	EquivalentInjection	0..1	EquivalentInjection	(NC) Equivalent injection which has equivalent injection schedules.
1..1	EquivalentInjectionTime Point	1..*	<a href="#">EquivalentInjectionTime Point</a>	(NC) The time point that relates to this equivalent injection schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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5755 **3.19.72 (NC) EnergyConnectionSchedule**5756 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5757 ExtEulIdentifiedObject

5758 Schedule for energy connection.

5759 Table 713 shows all attributes of EnergyConnectionSchedule.

5760 **Table 713 – Attributes of ExtSchedule::EnergyConnectionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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5762 Table 714 shows all association ends of EnergyConnectionSchedule with other classes.

5763 **Table 714 – Association ends of ExtSchedule::EnergyConnectionSchedule with other**  
5764 **classes**

mult from	name	mult to	type	description
0..*	EnergyConnection	0..1	EnergyConnection	(NC) Energy connection which has energy connection schedules.
1..1	EnergyConnectionTimePoint	1..*	<a href="#">EnergyConnectionTimePoint</a>	(NC) The time point that relates to this energy connection schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5765

5766 **3.19.73 (NC) TapSchedule**5767 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5768 ExtEulIdentifiedObject

5769 Schedule for tap.

5770 Table 715 shows all attributes of TapSchedule.

5771 **Table 715 – Attributes of ExtSchedule::TapSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>

name	mult	type	description
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5772

5773 Table 716 shows all association ends of TapSchedule with other classes.

5774

**Table 716 – Association ends of ExtSchedule::TapSchedule with other classes**

mult from	name	mult to	type	description
0..*	TapChanger	0..1	TapChanger	(NC) Tap changer which has tap schedules.
1..1	TapScheduleTimePoint	1..*	<a href="#">TapScheduleTimePoint</a>	(NC) The time point that relates to this tap schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5775

**3.19.74 (NC) EquivalentInjectionTimePoint root class**

5776 Equivalent injection values for a given point in time.

5777 Table 717 shows all attributes of EquivalentInjectionTimePoint.

5778

**Table 717 – Attributes of ExtSchedule::EquivalentInjectionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
regulationStatus	0..1	NullCIM	(NC) Specifies the regulation status of the EquivalentInjection. True is regulating. False is not regulating.
regulationTarget	0..1	NullCIM	(NC) The target voltage for voltage regulation. The attribute shall be a positive value.
p	1..1	NullCIM	(NC) Equivalent active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.
q	1..1	NullCIM	(NC) Equivalent reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.

5780

5781 Table 718 shows all association ends of EquivalentInjectionTimePoint with other classes.

5782 **Table 718 – Association ends of ExtSchedule::EquivalentInjectionTimePoint with other**  
5783 **classes**

mult from	name	mult to	type	description
1..*	EquivalentInjectionSchedule	1..1	<a href="#">EquivalentInjectionSchedule</a>	(NC) The EquivalentInjection schedule that has this time point.

5784

5785 **3.19.75 (NC) RegulatingControlSchedule**

5786 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5787 ExtEulIdentifiedObject

5788 Schedule for regulating control.

5789 Table 719 shows all attributes of RegulatingControlSchedule.

5790 **Table 719 – Attributes of ExtSchedule::RegulatingControlSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5791

5792 Table 720 shows all association ends of RegulatingControlSchedule with other classes.

5793 **Table 720 – Association ends of ExtSchedule::RegulatingControlSchedule with other**  
5794 **classes**

mult from	name	mult to	type	description
0..*	RegulatingControl	0..1	RegulatingControl	(NC) Regulating control which has regulating control schedules.
1..1	RegulatingControlTimePoint	1..*	<a href="#">RegulatingControlTimePoint</a>	(NC) The time point that relates to this regulating control schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5795

5796 **3.19.76 (NC) TapChangerControlSchedule**

5797 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5798 ExtEulIdentifiedObject

5799 Schedule for tap changer control.

5800 Table 721 shows all attributes of TapChangerControlSchedule.

5801 **Table 721 – Attributes of ExtSchedule::TapChangerControlSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5802

5803 Table 722 shows all association ends of TapChangerControlSchedule with other classes.

5804 **Table 722 – Association ends of ExtSchedule::TapChangerControlSchedule with other classes**

5805

mult from	name	mult to	type	description
0..*	TapChangerControl	0..1	TapChangerControl	(NC)
1..1	RegulatingControlTimePoint	1..*	<a href="#">RegulatingControlTimePoint</a>	(NC) The time point that relates to this tap changer control schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5806

### 5807 3.19.77 (NC) RegulatingControlTimePoint root class

5808 Regulating control values for a given point in time.

5809 Table 723 shows all attributes of RegulatingControlTimePoint.

5810 **Table 723 – Attributes of ExtSchedule::RegulatingControlTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
targetValue	1..1	NullCIM	(NC) The target value specified for case input. This value can be used for the target value without the use of schedules. The value has the units appropriate to the mode attribute.
targetValueUnitMultiplier	1..1	NullCIM	(NC) Specify the multiplier for used for the targetValue.
maxAllowedTargetValue	0..1	NullCIM	(NC) Maximum allowed target value (RegulatingControl.targetValue).

name	mult	type	description
minAllowedTargetValue	0..1	NullCIM	(NC) Minimum allowed target value (RegulatingControl.targetValue).

5811  
5812 Table 724 shows all association ends of RegulatingControlTimePoint with other classes.

5813 **Table 724 – Association ends of ExtSchedule::RegulatingControlTimePoint with other**  
5814 **classes**

mult from	name	mult to	type	description
1..*	RegulatingControlSchedule	1..1	<a href="#">RegulatingControlSchedule</a>	(NC) The regulating control schedule that has this time point.
1..*	TapChangerControlSchedule	1..1	<a href="#">TapChangerControlSchedule</a>	(NC) The tap changer control schedule that has this time point.

5815

### 5816 3.19.78 (NC) SwitchSchedule

5817 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5818 ExtEulIdentifiedObject  
5819 Schedule for switch.

5820 Table 725 shows all attributes of SwitchSchedule.

5821 **Table 725 – Attributes of ExtSchedule::SwitchSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5822

5823 Table 726 shows all association ends of SwitchSchedule with other classes.

5824 **Table 726 – Association ends of ExtSchedule::SwitchSchedule with other classes**

mult from	name	mult to	type	description
0..*	Switch	0..1	Switch	(NC) Switch which has switch schedules.
1..1	SwitchTimePoint	1..*	<a href="#">SwitchTimePoint</a>	The time point that relates to this switch schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5825

5826 **3.19.79 (NC) InServiceSchedule**5827 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5828 ExtEulIdentifiedObject

5829 Schedule for elements having in service.

5830 Table 727 shows all attributes of InServiceSchedule.

5831 **Table 727 – Attributes of ExtSchedule::InServiceSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5832

5833 Table 728 shows all association ends of InServiceSchedule with other classes.

5834 **Table 728 – Association ends of ExtSchedule::InServiceSchedule with other classes**

mult from	name	mult to	type	description
0..*	Equipment	0..1	Equipment	(NC) Equipment which has equipment schedules.
1..1	InServiceTimePoint	1..*	<a href="#">InServiceTimePoint</a>	(NC) The time point that relates to this in service schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5835

5836 **3.19.80 (NC) ControlAreaSchedule**5837 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5838 ExtEulIdentifiedObject

5839 Schedule for control area.

5840 Table 729 shows all attributes of ControlAreaSchedule.

5841

**Table 729 – Attributes of ExtSchedule::ControlAreaSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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5843

Table 730 shows all association ends of ControlAreaSchedule with other classes.

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**Table 730 – Association ends of ExtSchedule::ControlAreaSchedule with other classes**

mult from	name	mult to	type	description
0..*	ControlArea	0..1	ControlArea	(NC) Control area which has control area schedules.
1..1	ControlAreaTimePoint	1..*	<a href="#">ControlAreaTimePoint</a>	(NC) The time point that relates to this control area schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5845

**3.19.81 (NC) SynchronousMachineSchedule**

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

5848 Schedule for synchronous machine.

5849 Table 731 shows all attributes of SynchronousMachineSchedule.

5850

**Table 731 – Attributes of ExtSchedule::SynchronousMachineSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 732 shows all association ends of SynchronousMachineSchedule with other classes.

**Table 732 – Association ends of ExtSchedule::SynchronousMachineSchedule with other classes**

mult from	name	mult to	type	description
0..*	SynchronousMachine	0..1	SynchronousMachine	(NC) Synchronous machine which has synchronous machine schedules.
1..1	SynchronousMachineTimePoint	1..*	<a href="#">SynchronousMachineTimePoint</a>	(NC) The time point that relates to this synchronous machine schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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### 3.19.82 (NC) AsynchronousMachineSchedule

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Schedule for asynchronous machine.

Table 733 shows all attributes of AsynchronousMachineSchedule.

**Table 733 – Attributes of ExtSchedule::AsynchronousMachineSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 734 shows all association ends of AsynchronousMachineSchedule with other classes.

5865  
5866**Table 734 – Association ends of ExtSchedule::AsynchronousMachineSchedule with other classes**

mult from	name	mult to	type	description
0..*	AsynchronousMachine	0..1	AsynchronousMachine	(NC) Asynchronous machine which has asynchronous machine schedules.
1..1	AsynchronousMachineTimePoint	1..*	<a href="#">AsynchronousMachineTimePoint</a>	(NC) The time point that relates to this asynchronous machine schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5867

**3.19.83 (NC) ExternalNetworkInjectionSchedule**5869 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5870 ExtEulIdentifiedObject

5871 Schedule for external network injection.

5872 Table 735 shows all attributes of ExternalNetworkInjectionSchedule.

**Table 735 – Attributes of ExtSchedule::ExternalNetworkInjectionSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5874

5875 Table 736 shows all association ends of ExternalNetworkInjectionSchedule with other classes.

**Table 736 – Association ends of ExtSchedule::ExternalNetworkInjectionSchedule with other classes**

mult from	name	mult to	type	description
0..*	ExternalNetworkInjection	0..1	ExternalNetworkInjection	(NC) External Network Injection which has External Network Injection schedules.
1..1	ExternalNetworkInjectionTimePoint	1..*	<a href="#">ExternalNetworkInjectionTimePoint</a>	(NC) The time point that relates to this external network injection schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject

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mult from	name	mult to	type	description
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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5879 **3.19.84 (NC) VsConverterSchedule**5880 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5881 ExtEulIdentifiedObject

5882 Schedule for VS converter.

5883 Table 737 shows all attributes of VsConverterSchedule.

5884

**Table 737 – Attributes of ExtSchedule::VsConverterSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5885

5886 Table 738 shows all association ends of VsConverterSchedule with other classes.

5887 **Table 738 – Association ends of ExtSchedule::VsConverterSchedule with other classes**

mult from	name	mult to	type	description
0..*	VsConverter	0..1	VsConverter	(NC) Vs converter which has Vs converter schedules.
1..1	VsConverterTimePoint	1..*	<a href="#">VsConverterTimePoint</a>	(NC) The time point that relates to this VS converter schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5888

5889 **3.19.85 (NC) CsConverterSchedule**5890 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
5891 ExtEulIdentifiedObject

5892 Schedule for CS converter.

5893 Table 739 shows all attributes of CsConverterSchedule.

5894 **Table 739 – Attributes of ExtSchedule::CsConverterSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5895

5896 Table 740 shows all association ends of CsConverterSchedule with other classes.

5897 **Table 740 – Association ends of ExtSchedule::CsConverterSchedule with other classes**

mult from	name	mult to	type	description
0..*	CsConverter	0..1	CsConverter	(NC) Cs converter which has Cs converter schedules.
0..1	CsConverterTimePoint	0..*	<a href="#">CsConverterTimePoint</a>	(NC) The time point that relates to this CS converter schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

5898

### 5899 **3.19.86 (NC) ACDCTimePoint root class**

5900 ACDC values for a given point in time.

5901 Table 741 shows all attributes of ACDCTimePoint.

5902 **Table 741 – Attributes of ExtSchedule::ACDCTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
p	1..1	NullCIM	(NC) Active power at the point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution in the case a simplified power flow model is used.
q	1..1	NullCIM	(NC) Reactive power at the point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution in the case a simplified power flow model is used.

name	mult	type	description
targetPpcc	0..1	NullCIM	(NC) Real power injection target in AC grid, at point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node.
targetUdc	0..1	NullCIM	(NC) Target value for DC voltage magnitude. The attribute shall be a positive value.

5903

5904 **3.19.87 (NC) VsConverterTimePoint**5905 Inheritance path = [ACDCTimePoint](#)

5906 VS converter values for a given point in time.

5907 Table 742 shows all attributes of VsConverterTimePoint.

5908

**Table 742 – Attributes of ExtSchedule::VsConverterTimePoint**

name	mult	type	description
droop	0..1	NullCIM	(NC) Droop constant. The pu value is obtained as $D [kV/MW] \times S_b / U_{bdc}$ . The attribute shall be a positive value.
droopCompensation	0..1	NullCIM	(NC) Compensation constant. Used to compensate for voltage drop when controlling voltage at a distant bus. The attribute shall be a positive value.
pPccControl	1..1	NullCIM	(NC) Kind of control of real power and/or DC voltage.
qPccControl	1..1	NullCIM	(NC) Kind of reactive power control.
qShare	0..1	NullCIM	(NC) Reactive power sharing factor among parallel converters on Uac control. The attribute shall be a positive value or zero.
targetQpcc	0..1	NullCIM	(NC) Reactive power injection target in AC grid, at point of common coupling. Load sign convention is used, i.e. positive sign means flow out from a node.
targetUpcc	0..1	NullCIM	(NC) Voltage target in AC grid, at point of common coupling. The attribute shall be a positive value.
targetPowerFactorPcc	0..1	NullCIM	(NC) Power factor target at the AC side, at point of common coupling. The attribute shall be a positive value.
targetPhasePcc	0..1	NullCIM	(NC) Phase target at AC side, at point of common coupling. The attribute shall be a positive value.
targetPWMfactor	0..1	NullCIM	(NC) Magnitude of pulse-modulation factor. The attribute shall be a positive value.
atTime	0..1	DateTime	(NC) inherited from: <a href="#">ACDCTimePoint</a>
p	1..1	NullCIM	(NC) inherited from: <a href="#">ACDCTimePoint</a>
q	1..1	NullCIM	(NC) inherited from: <a href="#">ACDCTimePoint</a>
targetPpcc	0..1	NullCIM	(NC) inherited from: <a href="#">ACDCTimePoint</a>
targetUdc	0..1	NullCIM	(NC) inherited from: <a href="#">ACDCTimePoint</a>

5909

5910 Table 743 shows all association ends of VsConverterTimePoint with other classes.

5911 **Table 743 – Association ends of ExtSchedule::VsConverterTimePoint with other classes**

mult from	name	mult to	type	description
1..*	VsConverterSchedule	1..1	<a href="#">VsConverterSchedule</a>	(NC) The VS converter schedule that has this time point.

5912

5913 **3.19.88 (NC) CsConverterTimePoint**5914 Inheritance path = [ACDCTimePoint](#)

5915 CSCConverter values for a given point in time.

5916 Table 744 shows all attributes of CsConverterTimePoint.

5917 **Table 744 – Attributes of ExtSchedule::CsConverterTimePoint**

name	mult	type	description
operatingMode	1..1	NullCIM	(NC) Indicates whether the DC pole is operating as an inverter or as a rectifier. It is converter's control variable used in power flow.
pPccControl	1..1	NullCIM	(NC) Kind of active power control.
targetAlpha	0..1	NullCIM	(NC) Target firing angle. It is converter's control variable used in power flow. It is only applicable for rectifier if continuous tap changer control is used. Allowed values are within the range $\text{minAlpha} \leq \text{targetAlpha} \leq \text{maxAlpha}$ . The attribute shall be a positive value.
targetGamma	0..1	NullCIM	(NC) Target extinction angle. It is converter's control variable used in power flow. It is only applicable for inverter if continuous tap changer control is used. Allowed values are within the range $\text{minGamma} \leq \text{targetGamma} \leq \text{maxGamma}$ . The attribute shall be a positive value.
targetIdc	0..1	NullCIM	(NC) DC current target value. It is converter's control variable used in power flow. The attribute shall be a positive value.
atTime	0..1	DateTime	(NC) inherited from: <a href="#">ACDCTimePoint</a>
p	1..1	NullCIM	(NC) inherited from: <a href="#">ACDCTimePoint</a>
q	1..1	NullCIM	(NC) inherited from: <a href="#">ACDCTimePoint</a>
targetPpcc	0..1	NullCIM	(NC) inherited from: <a href="#">ACDCTimePoint</a>
targetUdc	0..1	NullCIM	(NC) inherited from: <a href="#">ACDCTimePoint</a>

5918

5919 Table 745 shows all association ends of CsConverterTimePoint with other classes.

5920 **Table 745 – Association ends of ExtSchedule::CsConverterTimePoint with other classes**

mult from	name	mult to	type	description
0..*	CsConverterSchedule	0..1	<a href="#">CsConverterSchedule</a>	(NC) The CS converter schedule that has this time point.

5921

5922 **3.19.89 (NC) TapScheduleTimePoint root class**

5923 Tap schedule values for a given point in time.

5924 Table 746 shows all attributes of TapScheduleTimePoint.

5925

**Table 746 – Attributes of ExtSchedule::TapScheduleTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
controlEnabled	1..1	NullCIM	(NC) Specifies the regulation status of the equipment. True is regulating, false is not regulating.
step	1..1	NullCIM	(NC) Tap changer position. Starting step for a steady state solution. Non integer values are allowed to support continuous tap variables. The reasons for continuous value are to support study cases where no discrete tap changer has yet been designed, a solution where a narrow voltage band forces the tap step to oscillate or to accommodate for a continuous solution as input. The attribute shall be equal to or greater than lowStep and equal to or less than highStep.

5926

5927

Table 747 shows all association ends of TapScheduleTimePoint with other classes.

5928

**Table 747 – Association ends of ExtSchedule::TapScheduleTimePoint with other classes**

5929

mult from	name	mult to	type	description
1..*	TapSchedule	1..1	<a href="#">TapSchedule</a>	(NC) The tap schedule that has this time point.

5930

**3.19.90 (NC) EnergyConnectionTimePoint root class**

5932 Energy connection values for a given point in time.

5933 Table 748 shows all attributes of EnergyConnectionTimePoint.

5934

**Table 748 – Attributes of ExtSchedule::EnergyConnectionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
p	1..1	NullCIM	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.
q	1..1	NullCIM	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.

5935

5936

Table 749 shows all association ends of EnergyConnectionTimePoint with other classes.

5937

**Table 749 – Association ends of ExtSchedule::EnergyConnectionTimePoint with other classes**

5938

mult from	name	mult to	type	description
1..*	EnergyConnectionSchedule	1..1	<a href="#">EnergyConnectionSchedule</a>	(NC) The energy connection schedule that has this time point.

5939

5940 **3.19.91 (NC) SwitchTimePoint root class**

5941 Switch values for a given point in time.

5942 Table 750 shows all attributes of SwitchTimePoint.

5943 **Table 750 – Attributes of ExtSchedule::SwitchTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
open	1..1	NullCIM	(NC) The attribute tells if the switch is considered open when used as input to topology processing.
locked	1..1	NullCIM	(NC) If true, the switch is locked. The resulting switch state is a combination of locked and Switch.open attributes as follows: - locked=true and Switch.open=true. The resulting state is open and locked; - locked=false and Switch.open=true. The resulting state is open; - locked=false and Switch.open=false. The resulting state is closed.

5944

5945 Table 751 shows all association ends of SwitchTimePoint with other classes.

5946 **Table 751 – Association ends of ExtSchedule::SwitchTimePoint with other classes**

mult from	name	mult to	type	description
1..*	SwitchSchedule	1..1	<a href="#">SwitchSchedule</a>	The switch schedule that has this time point.

5947

5948 **3.19.92 (NC) InServiceTimePoint root class**

5949 In service values for a given point in time.

5950 Table 752 shows all attributes of InServiceTimePoint.

5951 **Table 752 – Attributes of ExtSchedule::InServiceTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
inService	1..1	NullCIM	(NC) Specifies the availability of the equipment. True means the equipment is available for topology processing, which determines if the equipment is energized or not. False means that the equipment is treated by network applications as if it is not in the model.

5952

5953 Table 753 shows all association ends of InServiceTimePoint with other classes.

5954 **Table 753 – Association ends of ExtSchedule::InServiceTimePoint with other classes**

mult from	name	mult to	type	description
1..*	InServiceSchedule	1..1	<a href="#">InServiceSchedule</a>	(NC) The in service schedule that has this time point.

5955

5956 **3.19.93 (NC) ControlAreaTimePoint root class**

5957 Participation factor for a given point in time.

5958 Table 754 shows all attributes of ControlAreaTimePoint.

5959

**Table 754 – Attributes of ExtSchedule::ControlAreaTimePoint**

name	mult	type	description
pTolerance	0..1	NullCIM	(NC) Active power net interchange tolerance. The attribute shall be a positive value or zero.
netInterchange	1..1	NullCIM	(NC) The specified positive net interchange into the control area, i.e. positive sign means flow into the area.
atTime	0..1	DateTime	(NC) The time the data is valid for.

5960

5961

Table 755 shows all association ends of ControlAreaTimePoint with other classes.

5962

**Table 755 – Association ends of ExtSchedule::ControlAreaTimePoint with other classes**

mult from	name	mult to	type	description
1..*	ControlAreaSchedule	1..1	<a href="#">ControlAreaSchedule</a>	(NC) The control area schedule that has this time point.

5963

5964

**3.19.94 (NC) SynchronousMachineTimePoint root class**

5965

Synchronous machine values for a given point in time.

5966

Table 756 shows all attributes of SynchronousMachineTimePoint.

5967

**Table 756 – Attributes of ExtSchedule::SynchronousMachineTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
operatingMode	1..1	NullCIM	(NC) Current mode of operation.
referencePriority	1..1	NullCIM	(NC) Priority of unit for use as powerflow voltage phase angle reference bus selection. 0 = don t care (default) 1 = highest priority. 2 is less than 1 and so on.

5968

5969

Table 757 shows all association ends of SynchronousMachineTimePoint with other classes.

5970

**Table 757 – Association ends of ExtSchedule::SynchronousMachineTimePoint with other classes**

5971

mult from	name	mult to	type	description
1..*	SynchronousMachineSchedule	1..1	<a href="#">SynchronousMachineSchedule</a>	(NC) The synchronous machine schedule that has this time point.

5972

5973

**3.19.95 (NC) AsynchronousMachineTimePoint root class**

5974

Asynchronous machine values for a given point in time.

5975

Table 758 shows all attributes of AsynchronousMachineTimePoint.

5976

**Table 758 – Attributes of ExtSchedule::AsynchronousMachineTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
asynchronousMachineType	1..1	NullCIM	(NC) Indicates the type of Asynchronous Machine (motor or generator).

5977

5978

Table 759 shows all association ends of AsynchronousMachineTimePoint with other classes.

5979 **Table 759 – Association ends of ExtSchedule::AsynchronousMachineTimePoint with**  
5980 **other classes**

mult from	name	mult to	type	description
1..*	AsynchronousMachineSchedule	1..1	<a href="#">AsynchronousMachineSchedule</a>	(NC) The asynchronous machine schedule that has this time point.

5981

5982 **3.19.96 (NC) ExternalNetworkInjectionTimePoint root class**

5983 External network injection values for a given point in time.

5984 Table 760 shows all attributes of ExternalNetworkInjectionTimePoint.

5985 **Table 760 – Attributes of ExtSchedule::ExternalNetworkInjectionTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
referencePriority	1..1	NullCIM	(NC) Priority of unit for use as powerflow voltage phase angle reference bus selection. 0 = don't care (default) 1 = highest priority. 2 is less than 1 and so on.
p	1..1	NullCIM	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.
q	1..1	NullCIM	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.

5986

5987 Table 761 shows all association ends of ExternalNetworkInjectionTimePoint with other classes.

5988 **Table 761 – Association ends of ExtSchedule::ExternalNetworkInjectionTimePoint with**  
5989 **other classes**

mult from	name	mult to	type	description
1..*	ExternalNetworkInjectionSchedule	1..1	<a href="#">ExternalNetworkInjectionSchedule</a>	(NC) The external network injection schedule that has this time point.

5990

5991 **3.19.97 (NC) BatteryUnitSchedule**

5992 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

5993 ExtEulIdentifiedObject

5994 Schedule for battery unit.

5995 Table 762 shows all attributes of BatteryUnitSchedule.

5996 **Table 762 – Attributes of ExtSchedule::BatteryUnitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>

name	mult	type	description
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

5997

5998

Table 763 shows all association ends of BatteryUnitSchedule with other classes.

5999

**Table 763 – Association ends of ExtSchedule::BatteryUnitSchedule with other classes**

mult from	name	mult to	type	description
0..*	BatteryUnit	0..1	BatteryUnit	(NC) Battery unit which has battery unit schedules.
1..1	BatteryUnitTimePoint	1..*	<a href="#">BatteryUnitTimePoint</a>	(NC) The time point that relates to this battery unit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6000

6001

### 3.19.98 (NC) BatteryUnitTimePoint root class

6002

Battery unit values for a given point in time.

6003

Table 764 shows all attributes of BatteryUnitTimePoint.

6004

**Table 764 – Attributes of ExtSchedule::BatteryUnitTimePoint**

name	mult	type	description
batteryState	1..1	NullCIM	(NC) The current state of the battery (charging, full, etc.).
storedE	1..1	NullCIM	(NC) Amount of energy currently stored. The attribute shall be a positive value or zero and lower than BatteryUnit.ratedE.
atTime	0..1	DateTime	(NC) The time the data is valid for.

6005

6006

Table 765 shows all association ends of BatteryUnitTimePoint with other classes.

6007

**Table 765 – Association ends of ExtSchedule::BatteryUnitTimePoint with other classes**

mult from	name	mult to	type	description
1..*	BatteryUnitSchedule	1..1	<a href="#">BatteryUnitSchedule</a>	(NC) The battery unit schedule that has this time point.

6008

6009

### 3.19.99 (NC) VoltageLimitSchedule

6010

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

6011

ExtEulIdentifiedObject

6012

Schedule for voltage limit.

6013 Table 766 shows all attributes of VoltageLimitSchedule.

6014 **Table 766 – Attributes of ExtSchedule::VoltageLimitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6015

6016 Table 767 shows all association ends of VoltageLimitSchedule with other classes.

6017 **Table 767 – Association ends of ExtSchedule::VoltageLimitSchedule with other classes**

mult from	name	mult to	type	description
0..*	VoltageLimit	0..1	VoltageLimit	(NC) Voltage limit which has voltage limit schedules.
1..1	VoltageLimitTimePoint	1..*	<a href="#">VoltageLimitTimePoint</a>	(NC) The time point that relates to this voltage limit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6018

### 6019 3.19.100 (NC) ActivePowerLimitSchedule

6020 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
6021 ExtEulIdentifiedObject

6022 Schedule for active power limit.

6023 Table 768 shows all attributes of ActivePowerLimitSchedule.

6024 **Table 768 – Attributes of ExtSchedule::ActivePowerLimitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6025

6026

Table 769 shows all association ends of ActivePowerLimitSchedule with other classes.

6027

6028

**Table 769 – Association ends of ExtSchedule::ActivePowerLimitSchedule with other classes**

mult from	name	mult to	type	description
0..*	ActivePowerLimit	0..1	ActivePowerLimit	(NC) Active power limit which has active power limit schedules.
1..1	ActivePowerLimitTimePoint	1..*	<a href="#">ActivePowerLimitTimePoint</a>	(NC) The time point that relates to this active power limit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6029

6030

### 3.19.101 (NC) ApparentPowerLimitSchedule

6031

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

6032

Schedule for apparent power limit.

6033

Table 770 shows all attributes of ApparentPowerLimitSchedule.

6035

**Table 770 – Attributes of ExtSchedule::ApparentPowerLimitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6036

6037

Table 771 shows all association ends of ApparentPowerLimitSchedule with other classes.

6038 **Table 771 – Association ends of ExtSchedule::ApparentPowerLimitSchedule with other**  
6039 **classes**

mult from	name	mult to	type	description
0..*	ApparentPowerLimit	0..1	ApparentPowerLimit	(NC) Apparent power limit which has apparent power limit schedules.
1..1	ApparentPowerLimitTimePoint	1..*	<a href="#">ApparentPowerLimitTimePoint</a>	(NC) The time point that relates to this apparent power limit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6040

6041 **3.19.102 (NC) CurrentLimitSchedule**6042 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

6043 ExtEulIdentifiedObject

6044 Schedule for current limit.

6045 Table 772 shows all attributes of CurrentLimitSchedule.

6046 **Table 772 – Attributes of ExtSchedule::CurrentLimitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6047

6048 Table 773 shows all association ends of CurrentLimitSchedule with other classes.

6049 **Table 773 – Association ends of ExtSchedule::CurrentLimitSchedule with other classes**

mult from	name	mult to	type	description
0..*	CurrentLimit	0..1	CurrentLimit	(NC) Current limit which has current limit schedules.
1..1	CurrentLimitTimePoint	1..*	<a href="#">CurrentLimitTimePoint</a>	(NC) The time point that relates to this current limit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject

mult from	name	mult to	type	description
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6050

6051 **3.19.103 (NC) CurrentLimitTimePoint root class**

6052 Current limit values for a given point in time.

6053 Table 774 shows all attributes of CurrentLimitTimePoint.

6054

**Table 774 – Attributes of ExtSchedule::CurrentLimitTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
value	1..1	NullCIM	(NC) Limit on current flow. The attribute shall be a positive value or zero.

6055

6056 Table 775 shows all association ends of CurrentLimitTimePoint with other classes.

6057 **Table 775 – Association ends of ExtSchedule::CurrentLimitTimePoint with other classes**

mult from	name	mult to	type	description
1..*	CurrentLimitSchedule	1..1	<a href="#">CurrentLimitSchedule</a>	(NC) The current limit schedule that has this time point.

6058

6059 **3.19.104 (NC) ApparentPowerLimitTimePoint root class**

6060 Apparent power limit for a given point in time.

6061 Table 776 shows all attributes of ApparentPowerLimitTimePoint.

6062

**Table 776 – Attributes of ExtSchedule::ApparentPowerLimitTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
value	1..1	NullCIM	(NC) The apparent power limit. The attribute shall be a positive value or zero.

6063

6064 Table 777 shows all association ends of ApparentPowerLimitTimePoint with other classes.

6065 **Table 777 – Association ends of ExtSchedule::ApparentPowerLimitTimePoint with other classes**

6066

mult from	name	mult to	type	description
1..*	ApparentPowerLimitSchedule	1..1	<a href="#">ApparentPowerLimitSchedule</a>	(NC) The apparent power limit schedule that has this time point.

6067

6068 **3.19.105 (NC) ActivePowerLimitTimePoint root class**

6069 Active power limit for a given point in time.

6070 Table 778 shows all attributes of ActivePowerLimitTimePoint.

6071

**Table 778 – Attributes of ExtSchedule::ActivePowerLimitTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.

name	mult	type	description
value	1..1	NullCIM	(NC) Value of active power limit. The attribute shall be a positive value or zero.

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Table 779 shows all association ends of ActivePowerLimitTimePoint with other classes.

6074

**Table 779 – Association ends of ExtSchedule::ActivePowerLimitTimePoint with other classes**

6075

mult from	name	mult to	type	description
1..*	ActivePowerLimitSchedule	1..1	<a href="#">ActivePowerLimitSchedule</a>	(NC) The active power limit schedule that has this time point.

6076

### 6077 3.19.106 (NC) VoltageLimitTimePoint root class

6078

Voltage limit values for a given point in time.

6079

Table 780 shows all attributes of VoltageLimitTimePoint.

6080

**Table 780 – Attributes of ExtSchedule::VoltageLimitTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
value	1..1	NullCIM	(NC) Limit on voltage. High or low limit nature of the limit depends upon the properties of the operational limit type. The attribute shall be a positive value or zero.

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Table 781 shows all association ends of VoltageLimitTimePoint with other classes.

6083

**Table 781 – Association ends of ExtSchedule::VoltageLimitTimePoint with other classes**

mult from	name	mult to	type	description
1..*	VoltageLimitSchedule	1..1	<a href="#">VoltageLimitSchedule</a>	(NC) The voltage limit schedule that has this time point.

6084

### 6085 3.19.107 (NC) ShuntCompensatorSchedule

6086

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

6087

6088

Schedule for shunt compensator.

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Table 782 shows all attributes of ShuntCompensatorSchedule.

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**Table 782 – Attributes of ExtSchedule::ShuntCompensatorSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

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Table 783 shows all association ends of ShuntCompensatorSchedule with other classes.

**Table 783 – Association ends of ExtSchedule::ShuntCompensatorSchedule with other classes**

mult from	name	mult to	type	description
0..*	ShuntCompensator	0..1	ShuntCompensator	(NC) Shunt compensator which has shunt compensator schedules.
1..1	ShuntCompensatorTime Point	1..*	<a href="#">ShuntCompensatorTime Point</a>	(NC) The time point that relates to this shunt compensator schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

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### 3.19.108 (NC) ShuntCompensatorTimePoint root class

Shunt compensator values for a given point in time.

Table 784 shows all attributes of ShuntCompensatorTimePoint.

**Table 784 – Attributes of ExtSchedule::ShuntCompensatorTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
sections	1..1	NullCIM	(NC) Shunt compensator sections in use. Starting value for steady state solution. The attribute shall be a positive value or zero. Non integer values are allowed to support continuous variables. The reasons for continuous value are to support study cases where no discrete shunt compensators has yet been designed, a solutions where a narrow voltage band force the sections to oscillate or accommodate for a continuous solution as input.  For LinearShuntCompensator the value shall be between zero and ShuntCompensator.maximumSections. At value zero the shunt compensator conductance and admittance is zero. Linear interpolation of conductance and admittance between the previous and next integer section is applied in case of non-integer values.  For NonlinearShuntCompensator-s shall only be set to one of the NonlinearShuntCompensatorPoint.sectionNumber. There is no interpolation between NonlinearShuntCompensatorPoint-s.

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Table 785 shows all association ends of ShuntCompensatorTimePoint with other classes.

6102 **Table 785 – Association ends of ExtSchedule::ShuntCompensatorTimePoint with other**  
6103 **classes**

mult from	name	mult to	type	description
1..*	ShuntCompensatorSchedule	1..1	<a href="#">ShuntCompensatorSchedule</a>	(NC) The shunt compensator schedule that has this time point.

6104

6105 **3.19.109 (NC) GeneratingUnitSchedule**

6106 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

6107 ExtEulIdentifiedObject

6108 Schedule for generating unit.

6109 Table 786 shows all attributes of GeneratingUnitSchedule.

6110 **Table 786 – Attributes of ExtSchedule::GeneratingUnitSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6111

6112 Table 787 shows all association ends of GeneratingUnitSchedule with other classes.

6113 **Table 787 – Association ends of ExtSchedule::GeneratingUnitSchedule with other**  
6114 **classes**

mult from	name	mult to	type	description
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) Generating unit which has generating unit schedules.
1..1	GeneratingUnitTimePoint	1..*	<a href="#">GeneratingUnitTimePoint</a>	The time point that relates to this generating unit schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6115

6116 **3.19.110 (NC) GeneratingUnitTimePoint root class**

6117 Generating unit values for a given point in time.

6118 Table 788 shows all attributes of GeneratingUnitTimePoint.

6119

**Table 788 – Attributes of ExtSchedule::GeneratingUnitTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
normalPF	1..1	NullCIM	(NC) Generating unit economic participation factor. The sum of the participation factors across generating units does not have to sum to one. It is used for representing distributed slack participation factor. The attribute shall be a positive value or zero.

6120

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Table 789 shows all association ends of GeneratingUnitTimePoint with other classes.

6122

**Table 789 – Association ends of ExtSchedule::GeneratingUnitTimePoint with other classes**

6123

mult from	name	mult to	type	description
1..*	GeneratingUnitSchedule	1..1	<a href="#">GeneratingUnitSchedule</a>	The generating unit schedule that has this time point.

6124

**3.19.111 (NC) StaticVarCompensatorSchedule**

Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject : ExtEulIdentifiedObject

Schedule for static var compensator.

Table 790 shows all attributes of StaticVarCompensatorSchedule.

6130

**Table 790 – Attributes of ExtSchedule::StaticVarCompensatorSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6131

6132

Table 791 shows all association ends of StaticVarCompensatorSchedule with other classes.

6133

**Table 791 – Association ends of ExtSchedule::StaticVarCompensatorSchedule with other classes**

6134

mult from	name	mult to	type	description
0..*	StaticVarCompensator	0..1	StaticVarCompensator	(NC) Static var compensator which has static var compensator schedules.

mult from	name	mult to	type	description
1..1	StaticVarCompensatorTimePoint	1..*	<a href="#">StaticVarCompensatorTimePoint</a>	(NC) The time point that relates to this static var compensator schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6135

6136 **3.19.112 (NC) StaticVarCompensatorTimePoint root class**

6137 Static var compensator values for a given point in time.

6138 Table 792 shows all attributes of StaticVarCompensatorTimePoint.

6139 **Table 792 – Attributes of ExtSchedule::StaticVarCompensatorTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
q	1..1	NullCIM	(NC) Reactive power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.

6140

6141 Table 793 shows all association ends of StaticVarCompensatorTimePoint with other classes.

6142 **Table 793 – Association ends of ExtSchedule::StaticVarCompensatorTimePoint with other classes**

6143

mult from	name	mult to	type	description
1..*	StaticVarCompensatorSchedule	1..1	<a href="#">StaticVarCompensatorSchedule</a>	(NC) The StaticVarCompensator schedule that has this time point.

6144

6145 **3.19.113 (NC) StageTriggerSchedule**6146 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :  
6147 ExtEulIdentifiedObject

6148 Schedule for a stage trigger.

6149 Table 794 shows all attributes of StageTriggerSchedule.

6150 **Table 794 – Attributes of ExtSchedule::StageTriggerSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject

name	mult	type	description
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6151

6152 Table 795 shows all association ends of StageTriggerSchedule with other classes.

6153 **Table 795 – Association ends of ExtSchedule::StageTriggerSchedule with other classes**

mult from	name	mult to	type	description
0..*	StageTrigger	1..1	<a href="#">StageTrigger</a>	(NC) Stage trigger which has stage trigger schedules.
1..1	StageTriggerTimePoint	1..*	<a href="#">StageTriggerTimePoint</a>	(NC) Stage trigger time point that relates to this remedial action scheme schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6154

6155 **3.19.114 (NC) StageTriggerTimePoint root class**

6156 Stage trigger values at a given point in time.

6157 Table 796 shows all attributes of StageTriggerTimePoint.

6158 **Table 796 – Attributes of ExtSchedule::StageTriggerTimePoint**

name	mult	type	description
armed	0..1	Boolean	(NC) Defines the arming status of the remedial action scheme. It is set by operation or by signal.
atTime	0..1	DateTime	(NC) The time the data is valid for.
inService	0..1	Boolean	(NC) Specifies the availability of the Remedial Action Scheme (RAS). If true, the RAS is available for contingency processing. If false, the RAS is treated by contingency processing as if it is not in the model.

6159

6160 Table 797 shows all association ends of StageTriggerTimePoint with other classes.

6161 **Table 797 – Association ends of ExtSchedule::StageTriggerTimePoint with other classes**

6162

mult from	name	mult to	type	description
1..*	StageTriggerSchedule	1..1	<a href="#">StageTriggerSchedule</a>	(NC) Stage trigger schedule that has time point.

6163

6164 **3.19.115 (NC) GenericSequenceSchedule**6165 Inheritance path = [BaseIrregularTimeSeries](#) : [BaseTimeSeries](#) : IdentifiedObject :

6166 ExtEulIdentifiedObject

6167 Schedule for sequence.

6168 Table 798 shows all attributes of GenericSequenceSchedule.

6169

**Table 798 – Attributes of ExtSchedule::GenericSequenceSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	(NC) inherited from: <a href="#">BaseTimeSeries</a>
interpolationKind	0..1	<a href="#">TimeSeriesInterpolationKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
timeSeriesKind	0..1	<a href="#">BaseTimeSeriesKind</a>	(NC) inherited from: <a href="#">BaseTimeSeries</a>
actionMethod	0..1	String	(NC) inherited from: <a href="#">BaseTimeSeries</a>
percentile	0..1	Integer	(NC) inherited from: <a href="#">BaseTimeSeries</a>
aliasName	0..1	String	inherited from: IdentifiedObject
description	0..1	String	inherited from: IdentifiedObject
mRID	0..1	String	inherited from: IdentifiedObject
name	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEulIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEulIdentifiedObject

6170

6171 Table 799 shows all association ends of GenericSequenceSchedule with other classes.

6172 **Table 799 – Association ends of ExtSchedule::GenericSequenceSchedule with other**  
6173 **classes**

mult from	name	mult to	type	description
0..*	EnergyBlockOrder	0..1	<a href="#">EnergyBlockOrder</a>	(NC) Energy block order which has generic sequence schedules.
1..1	SequenceTimePoint	1..*	<a href="#">SequenceTimePoint</a>	(NC) The sequence timepoint for a sequence schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject

6174

6175 **3.19.116 (NC) SequenceTimePoint root class**

6176 Sequence at a given point in time.

6177 Table 800 shows all attributes of SequenceTimePoint.

6178 **Table 800 – Attributes of ExtSchedule::SequenceTimePoint**

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
sequence	0..1	Integer	(NC) Sequence needs to be ordered by the scheduling area. It has to be unique by the scheduling area.

6179

6180 Table 801 shows all association ends of SequenceTimePoint with other classes.

6181 **Table 801 – Association ends of ExtSchedule::SequenceTimePoint with other classes**

mult from	name	mult to	type	description
1..*	GenericSequenceSchedule	1..1	<a href="#">GenericSequenceSchedule</a>	(NC) The sequence schedule which belongs to the sequence timepoint.

6182