European Network of
Transmission System Operators
for Electricity

NETWORK CODES CANONICAL EXTENSIONS SPECIFICATION

2023-05-10

APPROVED DOCUMENT
VERSION 2.2

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The force of the following words is modified by the requirement level of the document in which they are used.

- SHALL: This word, or the terms “REQUIRED” or “MUST”, means that the definition is an absolute requirement of the specification.
- SHALL NOT: This phrase, or the phrase “MUST NOT”, means that the definition is an absolute prohibition of the specification.
- SHOULD: This word, or the adjective “RECOMMENDED”, means that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
- SHOULD NOT: This phrase, or the phrase “NOT RECOMMENDED”, means that there may exist valid reasons in particular circumstances when the particular behaviour is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behaviour described with this label.
- MAY: This word, or the adjective “OPTIONAL”, means that an item is truly optional.

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Revision History

Version	Release	Date	Paragraph	Comments
1	0	2021-03-22		SOC approved.
2	1	2022-09-21		SOC approved.
2	2	2023-05-10		ICTC approved

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1 Introduction

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

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

This document is describing extensions to support:

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

2 Specification documents references

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

- ENTSO-E Coordinated Security Analysis data exchange specification;

The class SimulationEvents is part of the IEC 61970-302:Ed2 and IEC 61970-457:Ed2[1] that is not part of CGMES 3.0 but will be included in upcoming version of CGMES. For technical reason this has not been tagged with the NC namespace because it is only referred to, not initiated. SimulationSetting profile is part of the header and metadata document.

3 Network codes extensions

3.1 General

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

3.2 ExtNetworkCodesCIMVersion root class

The version information assigned to the extensions defined for the need of network codes data exchanges.
Table 1 shows all attributes of ExtNetworkCodesCIMVersion.

Table 1 – Attributes of ExtNetworkCodes::ExtNetworkCodesCIMVersion

name	mult	type	description
date	0..1	Date	(const=2023-04-20) 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=2.2) 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.

[1] At the time of publication of this document, both standards are in FDIS (Final Draft International Standard) stage.

3.3 Package ExtArea

3.3.1 General

This package contains the extensions related to the areas.

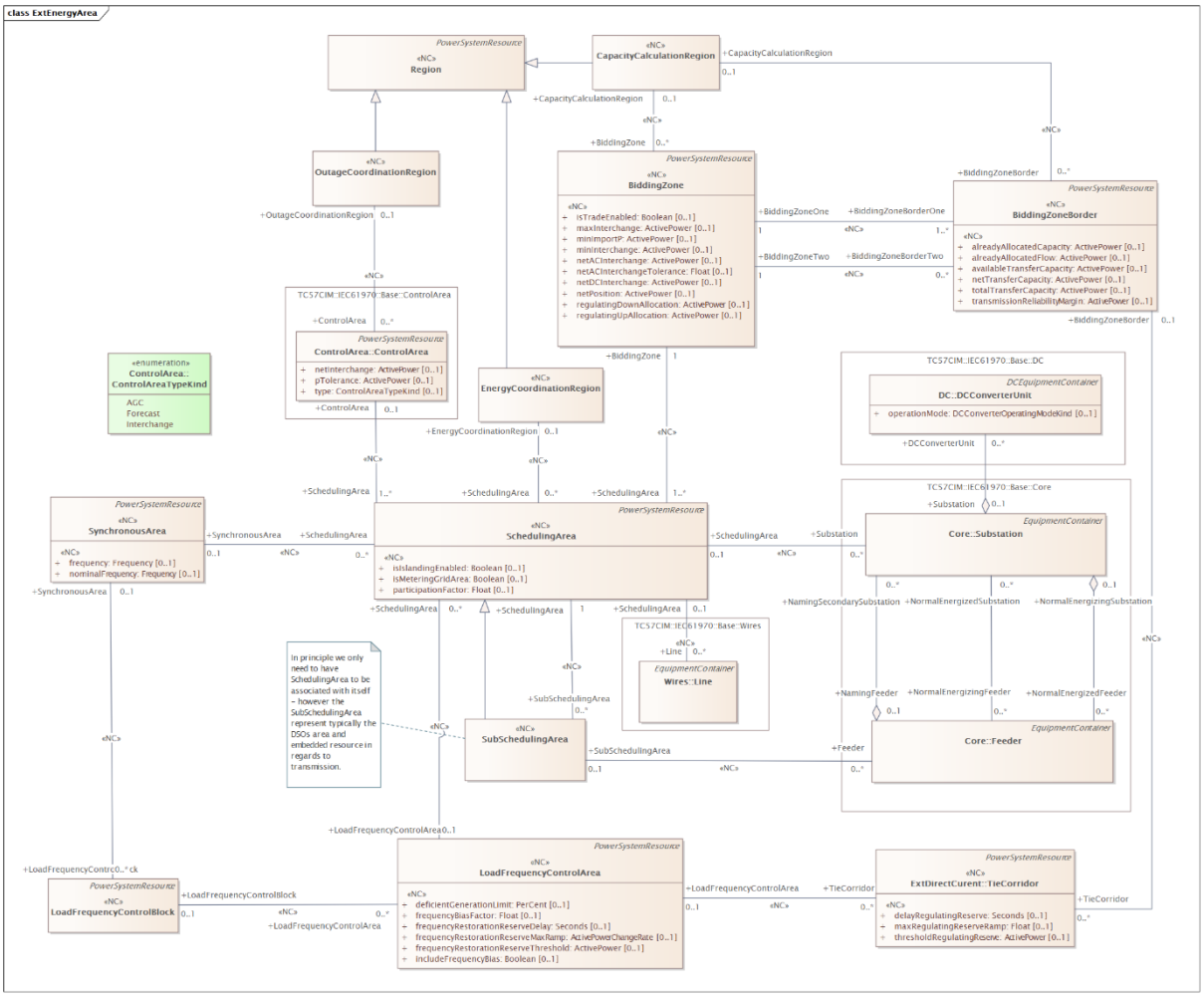

Figure 1 – Class diagram ExtArea::ExtEnergyArea

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

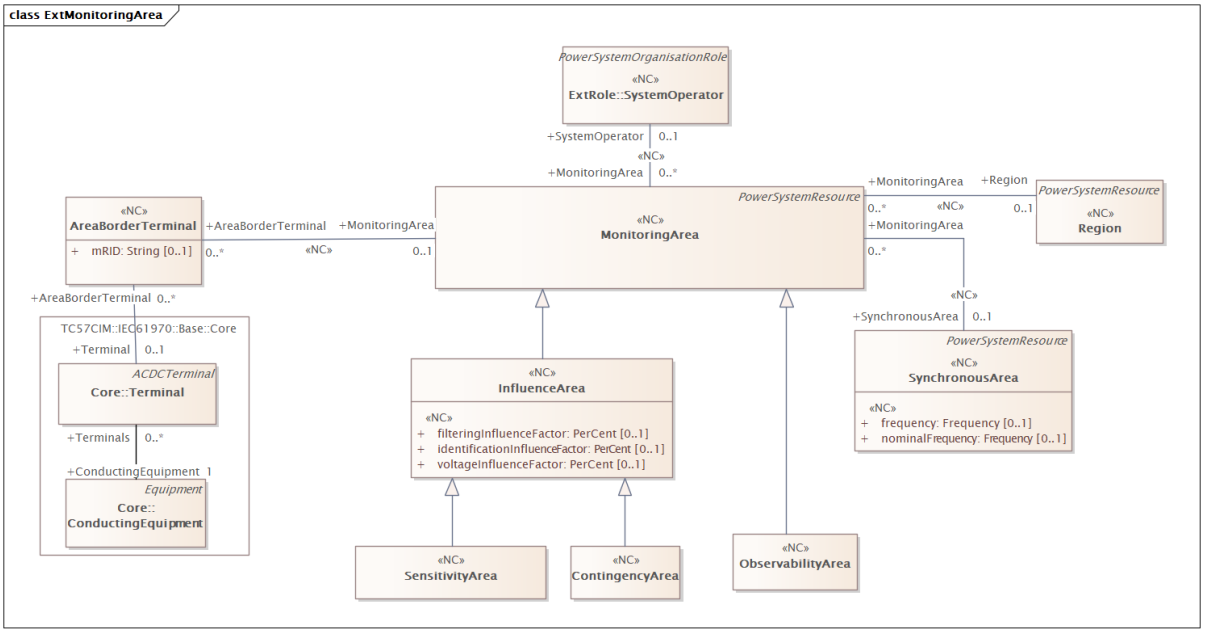

Figure 2 – Class diagram ExtArea::ExtMonitoringArea

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

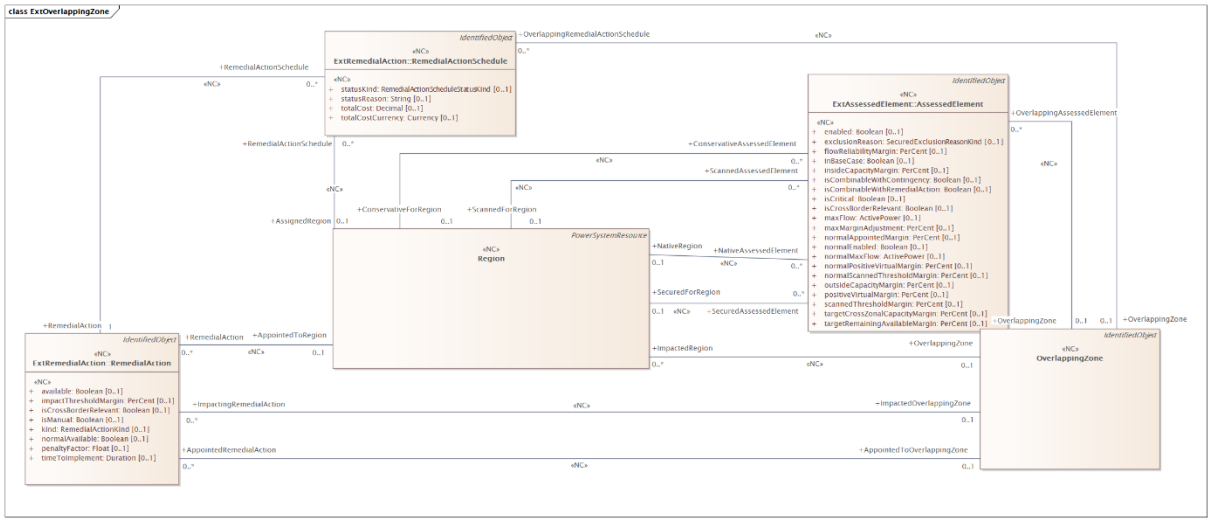

Figure 3 – Class diagram ExtArea::ExtOverlappingZone

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

3.3.2 (NC) AreaBorderTerminal root class

Area border terminal defines the terminals that are defining a monitoring area.
Table 2 shows all attributes of AreaBorderTerminal.

Table 2 – 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

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.

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

Table 3 – 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	MonitoringArea	(NC) The MonitoringArea defined by this AreaBorderTerminal.

3.3.3 (NC) BiddingZone

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 4 shows all attributes of BiddingZone.

Table 4 – 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.
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.
maxInterchange	0..1	ActivePower	(NC) Maximum total active power (AC and DC) that the net position for the bidding zone can have to maintain operational security. Positive sign means flow into the bidding zone.
minImportP	0..1	ActivePower	(NC) Minimum imported active power requirement.
regulatingDownAllocation	0..1	ActivePower	(NC) The balancing capacity allocated for regulating down, by decreasing the production, increasing the direct current export, decreasing

name	mult	type	description
			direct current import or increasing the consumption of energy in the bidding zone. This must be a positive number.
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.
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 5 shows all association ends of BiddingZone with other classes.

Table 5 – Association ends of ExtArea::BiddingZone with other classes

mult from	name	mult to	type	description
1..1	SchedulingArea	1..*	SchedulingArea	(NC) The scheduling area that has bidding zone.
0..*	CapacityCalculationRegion	0..1	CapacityCalculationRegion	(NC) The capacity calculation region related to this bidding zone.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which belongs to the power bidding zone.
1..1	BiddingZoneBorderOne	1..*	BiddingZoneBorder	(NC) The primary side of the border.
1..1	BiddingZoneBorderTwo	0..*	BiddingZoneBorder	(NC) The secondary side of the border.
0..1	PowerRemedialAction	0..*	PowerRemedialAction	(NC) The power remedial action applied to this BiddingZone.
1..1	BiddingZoneAction	0..*	BiddingZoneAction	(NC) The bidding zone action that relates to this bidding zone.
0..1	CapacitySchedule	0..*	CapacitySchedule	(NC) Capacity schedule which contains information on the referred 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.4 (NC) BiddingZoneBorder

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Defines the aggregated connection capacity between two Bidding Zones.
Table 6 shows all attributes of BiddingZoneBorder.

Table 6 – 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.
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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

Table 7 – Association ends of ExtArea::BiddingZoneBorder with other classes

mult from	name	mult to	type	description
1..*	BiddingZoneOne	1..1	BiddingZone	(NC) The bidding zone for the primary side.
0..*	BiddingZoneTwo	1..1	BiddingZone	(NC) The bidding zone for the secondary side.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which has bidding zone border.

mult from	name	mult to	type	description
0..*	CapacityCalculationRegion	0..1	CapacityCalculationRegion	(NC) The capacity calculation region for which the capacity is derived from.
0..1	TieCorridor	0..*	TieCorridor	(NC) Tie corridor for a given 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.5 (NC) CapacityCalculationRegion

Inheritance path = Region : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
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.
Table 8 shows all attributes of CapacityCalculationRegion.

Table 8 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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

Table 9 – Association ends of ExtArea::CapacityCalculationRegion with other classes

mult from	name	mult to	type	description
0..1	BiddingZoneBorder	0..*	BiddingZoneBorder	(NC) The bidding zone border on which the capacity is calculated.
0..1	BiddingZone	0..*	BiddingZone	(NC) The bidding zone for this capacity calculation region.
0..*	SecurityCoordinator	0..1	SecurityCoordinator	(NC) The security coordinator responsible for the capacity calculation region.
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: Region
0..1	ConservativeAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: Region

mult from	name	mult to	type	description
0..1	SecuredAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: Region
0..1	LimitViolation	0..*	PowerFlowResult	(NC) inherited from: Region
0..*	OverlappingZone	0..1	OverlappingZone	(NC) inherited from: Region
0..1	ScannedAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	NativeAssessedElement	0..*	AssessedElement	(NC) inherited from: 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.6 (NC) ContingencyArea

Inheritance path = InfluenceArea : MonitoringArea : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 10 shows all attributes of ContingencyArea.

Table 10 – Attributes of ExtArea::ContingencyArea

name	mult	type	description
identificationInfluenceFactor	0..1	PerCent	(NC) inherited from: InfluenceArea
filteringInfluenceFactor	0..1	PerCent	(NC) inherited from: InfluenceArea
voltageInfluenceFactor	0..1	PerCent	(NC) inherited from: InfluenceArea
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

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

Table 11 – Association ends of ExtArea::ContingencyArea with other classes

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: MonitoringArea
0..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) inherited from: MonitoringArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: MonitoringArea
0..*	Region	0..1	Region	(NC) inherited from: MonitoringArea
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.7 (NC) EnergyCoordinationRegion

Inheritance path = Region : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

A region that has a common organisation or a service that is responsible for alignment of forecast and scheduling of energy.

Table 12 shows all attributes of EnergyCoordinationRegion.

Table 12 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 13 shows all association ends of EnergyCoordinationRegion with other classes.

Table 13 – Association ends of ExtArea::EnergyCoordinationRegion with other classes

mult from	name	mult to	type	description
0..1	SchedulingArea	0..*	SchedulingArea	(NC) The scheduling area that is part of this energy coordination region.
0..*	EnergyAlignmentCoordinator	0..1	EnergyAlignmentCoordinator	(NC) The energy alignment coordinator that operates this energy coordination region.
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: Region
0..1	ConservativeAssessedElement	0..*	AssessedElement	(NC) inherited from: Region

mult from	name	mult to	type	description
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: Region
0..1	SecuredAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: Region
0..1	LimitViolation	0..*	PowerFlowResult	(NC) inherited from: Region
0..*	OverlappingZone	0..1	OverlappingZone	(NC) inherited from: Region
0..1	ScannedAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	NativeAssessedElement	0..*	AssessedElement	(NC) inherited from: 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.8 (NC) InfluenceArea

Inheritance path = MonitoringArea : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Influence area is a monitoring area that is defined by calculating the equipment that is affected by the influence factors.

Table 14 shows all attributes of InfluenceArea.

Table 14 – 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

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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

Table 15 – Association ends of ExtArea::InfluenceArea with other classes

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: MonitoringArea
0..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) inherited from: MonitoringArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: MonitoringArea
0..*	Region	0..1	Region	(NC) inherited from: MonitoringArea
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.9 (NC) LoadFrequencyControlArea

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A part of a synchronous area or an entire synchronous area, physically demarcated by points of measurement at interconnectors to other load frequency control (LFC) areas, operated by one or more TSOs fulfilling the obligations of load-frequency control.
Table 16 shows all attributes of LoadFrequencyControlArea.

Table 16 – 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.

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

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

Table 17 – Association ends of ExtArea::LoadFrequencyControlArea with other classes

mult from	name	mult to	type	description
0..1	SchedulingArea	0..*	SchedulingArea	(NC) The scheduling area that is part of this load frequency control area.
0..*	LoadFrequencyControlBlock	0..1	LoadFrequencyControlBlock	(NC) The load frequency control block that has this load frequency control area.
0..*	FrequencyControlOperator	0..1	LoadFrequencyControlOperator	(NC) The frequency control operator that operates this frequency control area.
0..1	TieCorridor	0..*	TieCorridor	(NC) TieCorridor controlled by the LoadFrequencyControlArea.
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.10 (NC) LoadFrequencyControlBlock

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 18 shows all attributes of LoadFrequencyControlBlock.

Table 18 – 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	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

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

Table 19 – Association ends of ExtArea::LoadFrequencyControlBlock with other classes

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	SynchronousArea	(NC) The synchronous area that has this load frequency control block.
0..1	LoadFrequencyControlArea	0..*	LoadFrequencyControlArea	(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
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.11 (NC) MonitoringArea

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A coherent part of the interconnected electrical power system, that includes the system operators' responsibility area and the surrounding parts of other system operators' responsibility area, that need to be monitored for security assessment.
Table 20 shows all attributes of MonitoringArea.

Table 20 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 21 shows all association ends of MonitoringArea with other classes.

Table 21 – Association ends of ExtArea::MonitoringArea with other classes

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	SynchronousArea	(NC) The synchronous area that has this monitoring area.
0..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) The AreaBorderTerminal which defines the MonitoringArea.
0..*	SystemOperator	0..1	SystemOperator	(NC) The system operator that operates this monitoring area.
0..*	Region	0..1	Region	(NC) Region that has monitoring areas.
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.12 (NC) ObservabilityArea

Inheritance path = MonitoringArea : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 22 shows all attributes of ObservabilityArea.

Table 22 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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

Table 23 – Association ends of ExtArea::ObservabilityArea with other classes

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: MonitoringArea
0..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) inherited from: MonitoringArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: MonitoringArea
0..*	Region	0..1	Region	(NC) inherited from: MonitoringArea
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.13 (NC) OutageCoordinationRegion

Inheritance path = Region : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A region that has a common organisation or service responsible for outage planning and coordination and its impact on grid operation.
Table 24 shows all attributes of OutageCoordinationRegion.

Table 24 – Attributes of ExtArea::OutageCoordinationRegion

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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

Table 25 – 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..*	SecurityCoordinator	0..1	SecurityCoordinator	(NC) The security coordinator that is responsible for this outage coordination region.
0..*	OutageCoordinator	0..1	OutageCoordinator	(NC) The outage coordinator responsible for this outage coordination region.
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: Region
0..1	ConservativeAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: Region
0..1	SecuredAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: Region
0..1	LimitViolation	0..*	PowerFlowResult	(NC) inherited from: Region

mult from	name	mult to	type	description
0..*	OverlappingZone	0..1	OverlappingZone	(NC) inherited from: Region
0..1	ScannedAssessedElement	0..*	AssessedElement	(NC) inherited from: Region
0..1	NativeAssessedElement	0..*	AssessedElement	(NC) inherited from: 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.14 (NC) OverlappingZone

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

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

Table 26 shows all attributes of OverlappingZone.

Table 26 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 27 shows all association ends of OverlappingZone with other classes.

Table 27 – Association ends of ExtArea::OverlappingZone with other classes

mult from	name	mult to	type	description
0..1	ImpactingRemedialAction	0..*	RemedialAction	(NC) The remedial action that is impacting an overlapping zone.
0..1	AppointedRemedialAction	0..*	RemedialAction	(NC) The appointed remedial action that is appointed to an overlapping zone.
0..1	OverlappingAssessedElement	0..*	AssessedElement	(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.

mult from	name	mult to	type	description
0..1	OverlappingRemedialActionSchedule	0..*	RemedialActionSchedule	(NC) The remedial action schedule which is overlapping for this zone.
0..1	ImpactedRegion	0..*	Region	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.15 (NC) Region

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

A region where the system operator belongs to.

Table 28 shows all attributes of Region.

Table 28 – Attributes of ExtArea::Region

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 29 shows all association ends of Region with other classes.

Table 29 – Association ends of ExtArea::Region with other classes

mult from	name	mult to	type	description
0..1	MonitoringArea	0..*	MonitoringArea	(NC) Monitoring area which belongs to a region.
0..1	ConservativeAssessedElement	0..*	AssessedElement	(NC) The assessed element which is considered conservative for this region.
0..1	RemedialAction	0..*	RemedialAction	(NC) The remedial action which is considered in the region.
0..1	SecuredAssessedElement	0..*	AssessedElement	(NC) The assessed element secured for this region.
0..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) The remedial action schedule relevant for this region.
0..1	LimitViolation	0..*	PowerFlowResult	(NC) The limit violation reported by a region.
0..*	OverlappingZone	0..1	OverlappingZone	(NC) The overlapping zone which is impacted by this region.
0..1	ScannedAssessedElement	0..*	AssessedElement	(NC) These are the scanned assessed elements for a region.
0..1	NativeAssessedElement	0..*	AssessedElement	(NC) The native assessed element for a native region.

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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.16 (NC) ScheduleResource

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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.

Table 30 shows all attributes of ScheduleResource.

Table 30 – 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/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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 31 shows all association ends of ScheduleResource with other classes.

Table 31 – Association ends of ExtArea::ScheduleResource with other classes

mult from	name	mult to	type	description
0..1	AreaDispatchableUnit	0..1	AreaDispatchableUnit	(NC) The dispatchable unit for this scheduled resource.

mult from	name	mult to	type	description
0..1	PowerElectronicsUnit	0..*	PowerElectronicsUnit	(NC) The power electronics unit that relates to this schedule resource.
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..*	SchedulingArea	0..1	SchedulingArea	(NC) The scheduling area that has this schedule resource.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which belongs to the schedule resource.
0..*	ResourceOf	0..1	ScheduleResource	(NC) The schedule resource that has this subschedule resource.
0..1	GLSKSchedule	0..*	GLSKSchedule	(NC) The GLSK schedule for a schedule resource.
0..1	RedispatchAction	0..*	RedispatchScheduleAction	(NC) The redispatch action that relates to this schedule resource.
0..1	PowerBidSchedule	0..*	PowerBidSchedule	(NC) Power bid schedule which belongs to a schedule resource.
0..1	SubScheduleResource	0..*	ScheduleResource	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.17 (NC) SchedulingArea

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
An area where production and/or consumption of energy can be forecasted, scheduled and measured. The area is operated by only one system operator, typically a Transmission System Operator (TSO). The area can consist of a sub area, which has the same definition as the main area, but it can be operated by another system operator (typically Distributed System Operator (DSO) or a Closed Distributed System Operator (CDSO)). This includes microgrid concept. A substation is the smallest grouping that can be included in the area. The area size should be considered in terms of the possibility of accumulated reading (settlement metering) and the capability of operating as an island.
Table 32 shows all attributes of SchedulingArea.

Table 32 – 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

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

Table 33 shows all association ends of SchedulingArea with other classes.

Table 33 – Association ends of ExtArea::SchedulingArea with other classes

mult from	name	mult to	type	description
0..1	DCTieCorridor	0..1	DCTieCorridor	(NC) The DC tie corridor that is part of this scheduling area.
1..*	ControlArea	0..1	ControlArea	(NC) The control area for this scheduling area.
0..1	Line	0..*	Line	(NC) The line that is part of this scheduling area.
0..1	Substation	0..*	Substation	(NC) The substation that is part of this scheduling area.
0..1	PowerSchedule	0..*	PowerSchedule	Power schedule which belongs to the scheduling area.
1..*	BiddingZone	1..1	BiddingZone	(NC) The bidding zone related to this scheduling area.
0..*	EnergyCoordinationRegion	0..1	EnergyCoordinationRegion	(NC) The energy coordination region that has this scheduling area.
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) The load frequency control area which has this scheduling area.
0..1	ScheduleResource	0..*	ScheduleResource	(NC) The schedule resource that belongs to this scheduled area.
1..1	AreaDispatchableUnit	0..*	AreaDispatchableUnit	(NC) The area dispatchable unit related to a scheduling area.
0..1	EnergyGroup	0..*	EnergyGroup	(NC) The energy group belonging to a given energy scheduling area.
1..1	SubSchedulingArea	0..*	SubSchedulingArea	(NC) The subscheduling are that belongs to this scheduling area.

mult from	name	mult to	type	description
0..*	SynchronousArea	0..1	SynchronousArea	(NC) The synchronous are that has this scheduling area.
0..*	SystemOperator	0..1	SystemOperator	(NC) The system operator for this scheduling 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.18 (NC) SensitivityArea

Inheritance path = InfluenceArea : MonitoringArea : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 34 shows all attributes of SensitivityArea.

Table 34 – Attributes of ExtArea::SensitivityArea

name	mult	type	description
identificationInfluenceFactor	0..1	PerCent	(NC) inherited from: InfluenceArea
filteringInfluenceFactor	0..1	PerCent	(NC) inherited from: InfluenceArea
voltageInfluenceFactor	0..1	PerCent	(NC) inherited from: InfluenceArea
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

Table 35 shows all association ends of SensitivityArea with other classes.

Table 35 – Association ends of ExtArea::SensitivityArea with other classes

mult from	name	mult to	type	description
0..1	QuantitativeRemedialActionImpact	0..*	QuantitativeRemedialActionImpact	(NC) Quantitative remedial action impact when the remedial action is influencing equipment included in the sensitivity area.
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: MonitoringArea
0..1	AreaBorderTerminal	0..*	AreaBorderTerminal	(NC) inherited from: MonitoringArea

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

3.3.19 (NC) SubSchedulingArea

Inheritance path = SchedulingArea : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 36 shows all attributes of SubSchedulingArea.

Table 36 – Attributes of ExtArea::SubSchedulingArea

name	mult	type	description
isIslandingEnabled	0..1	Boolean	(NC) inherited from: SchedulingArea
isMeteringGridArea	0..1	Boolean	(NC) inherited from: SchedulingArea
participationFactor	0..1	Float	(NC) inherited from: SchedulingArea
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

Table 37 shows all association ends of SubSchedulingArea with other classes.

Table 37 – Association ends of ExtArea::SubSchedulingArea with other classes

mult from	name	mult to	type	description
0..*	SchedulingArea	1..1	SchedulingArea	(NC) The scheduling area that has this subscheduling area.
0..1	Feeder	0..*	Feeder	(NC) The feeder that is part of this subscheduling area.
0..1	DCTieCorridor	0..1	DCTieCorridor	(NC) inherited from: SchedulingArea

mult from	name	mult to	type	description
1..*	ControlArea	0..1	ControlArea	(NC) inherited from: SchedulingArea
0..1	Line	0..*	Line	(NC) inherited from: SchedulingArea
0..1	Substation	0..*	Substation	(NC) inherited from: SchedulingArea
0..1	PowerSchedule	0..*	PowerSchedule	inherited from: SchedulingArea
1..*	BiddingZone	1..1	BiddingZone	(NC) inherited from: SchedulingArea
0..*	EnergyCoordinationRegion	0..1	EnergyCoordinationRegion	(NC) inherited from: SchedulingArea
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) inherited from: SchedulingArea
0..1	ScheduleResource	0..*	ScheduleResource	(NC) inherited from: SchedulingArea
1..1	AreaDispatchableUnit	0..*	AreaDispatchableUnit	(NC) inherited from: SchedulingArea
0..1	EnergyGroup	0..*	EnergyGroup	(NC) inherited from: SchedulingArea
1..1	SubSchedulingArea	0..*	SubSchedulingArea	(NC) inherited from: SchedulingArea
0..*	SynchronousArea	0..1	SynchronousArea	(NC) inherited from: SchedulingArea
0..*	SystemOperator	0..1	SystemOperator	(NC) inherited from: SchedulingArea
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.3.20 (NC) SynchronousArea

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 38 shows all attributes of SynchronousArea.

Table 38 – 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.
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 39 shows all association ends of SynchronousArea with other classes.

Table 39 – Association ends of ExtArea::SynchronousArea with other classes

mult from	name	mult to	type	description
0..1	SchedulingArea	0..*	SchedulingArea	(NC) The scheduling area that is part of this synchronous area.
0..1	LoadFrequencyControlBlock	0..*	LoadFrequencyControlBlock	(NC) The load frequency control block that is part of this synchronous area.
0..1	MonitoringArea	0..*	MonitoringArea	(NC) The monitoring area 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.4 Assessed element extensions

3.4.1 General

This package contains the extensions related to the assessed element.

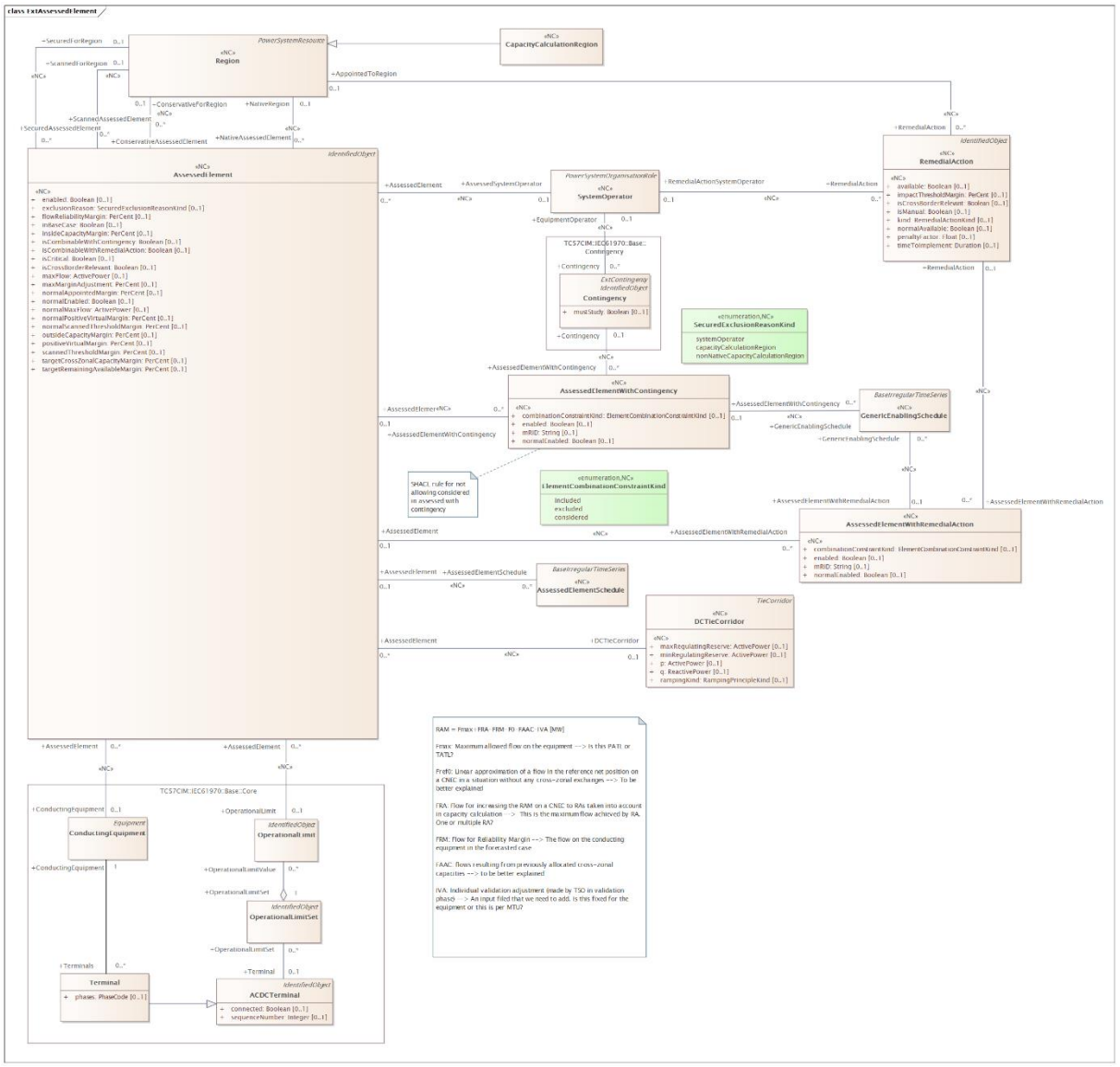

Figure 4 – Class diagram ExtAssessedElement::ExtAssessedElement

Figure 4: The diagram contains classes related to assessed element.

3.4.2 (NC) AssessedElement

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Assessed element is a network element for which the electrical state is evaluated in the regional or cross-regional process and which value is expected to fulfil regional rules function of the operational security limits.
The measurements and limits are as defined in the steady state hypothesis.
Table 40 shows all attributes of AssessedElement.

Table 40 – Attributes of ExtAssessedElement::AssessedElement

name	mult	type	description
inBaseCase	0..1	Boolean	(NC) Indicates if the assessed element is scanned in the base case. In case of a base case overload, the assessed element is considered as a limiting element for the optimization process.

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].
isCritical	0..1	Boolean	(NC) Indicates if the assessed element is critical. True, means that the assessed element is critical. False, means that the assessed element is not critical. Critical means that the assessed element for the conducting equipment or power transfer corridor are considered limiting for the power exchange.
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.

name	mult	type	description
normalAppointedMargin	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. 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].
isCrossBorderRelevant	0..1	Boolean	(NC) If true, the conducting equipment or the power transfer corridor is cross border relevant.
exclusionReason	0..1	SecuredExclusionReasonKind	(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

name	mult	type	description
			threshold margin, the new maximum is 115% of the limit (e.g. PATL, TATL, etc). 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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

Table 41 – Association ends of ExtAssessedElement::AssessedElement with other classes

mult from	name	mult to	type	description
0..*	ScannedForRegion	0..1	Region	(NC) This is the region in which this assessed element is scanned.
0..*	NativeRegion	0..1	Region	(NC) The native region for an assessed element.
0..*	AssessedSystemOperator	0..1	SystemOperator	(NC) A system operator that assesses the element.
0..1	AssessedElementWithContingency	0..*	AssessedElementWithContingency	(NC) The contingency and assessed element combination to be simulated for this assessed element.
0..*	OperationalLimit	0..1	OperationalLimit	(NC) The terminal limit that is being assessed against.
0..*	AssessedPowerTransferCorridor	0..1	PowerTransferCorridor	(NC) The power transfer corridor that is designated as an assessed element.
0..*	ConductingEquipment	0..1	ConductingEquipment	(NC) The conducting equipment that is designated as an assessed element, i.e. the equipment that is assessed.
0..1	AssessedElementSchedule	0..*	AssessedElementSchedule	(NC) Assessed element schedule for an assessed element.
0..*	OverlappingZone	0..1	OverlappingZone	(NC) The overlapping zone grouping the overlapping assessed elements.
0..*	ConservativeForRegion	0..1	Region	(NC) This is the region where the element is considered conservative.
0..*	SecuredForRegion	0..1	Region	(NC) This is the region where the element is secured.
0..1	ObservableQuantity	0..*	ObservableQuantity	(NC) The observable quantity for this assessed element with contingency.
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) The assessed element and remedial action combination to be simulated for this assessed element.
0..*	DCTieCorridor	0..1	DCTieCorridor	(NC) The DC tie corridor that is assessed.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) Availability enabled describes the enabling or disabling of this assessed element.
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.4.3 (NC) AssessedElementWithContingency root class

Combination of an assessed element and a contingency.
Table 42 shows all attributes of AssessedElementWithContingency.

Table 42 – 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	ElementCombinationConstraintKind	(NC) Defines the combination constraint of the AssessedElement and Contingency. If included, this assessed element is only assessed for this 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.

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

Table 43 – Association ends of 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..*	GenericEnablingSchedule	(NC) Enabling schedule which belongs to the assessed element with contingency.
0..*	AssessedElement	0..1	AssessedElement	(NC) The assessed element defined for this contingency and assessed element combination.

3.4.4 (NC) AssessedElementWithRemedialAction root class

Combination of an assessed element and a remedial action
Table 44 shows all attributes of AssessedElementWithRemedialAction.

1388 **Table 44 – 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	ElementCombinationConstraintKind	(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.

1389
1390 Table 45 shows all association ends of AssessedElementWithRemedialAction with other
1391 classes.

1392 **Table 45 – Association ends of**
1393 **ExtAssessedElement::AssessedElementWithRemedialAction with other classes**

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

1394

1395 ### 3.4.5 (NC) ElementCombinationConstraintKind enumeration

1396 Kind of constraint for an element combination.
1397 Table 46 shows all literals of ElementCombinationConstraintKind.

1398 **Table 46 – Literals of ExtAssessedElement::ElementCombinationConstraintKind**

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

1399

3.4.6 (NC) SecuredExclusionReasonKind enumeration

The kind of secured exclusion reason.

Table 47 shows all literals of SecuredExclusionReasonKind.

Table 47 – 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.

3.5 Package ExtAvailabilitySchedule

3.5.1 General

This package contains the extensions related to the availability schedule.

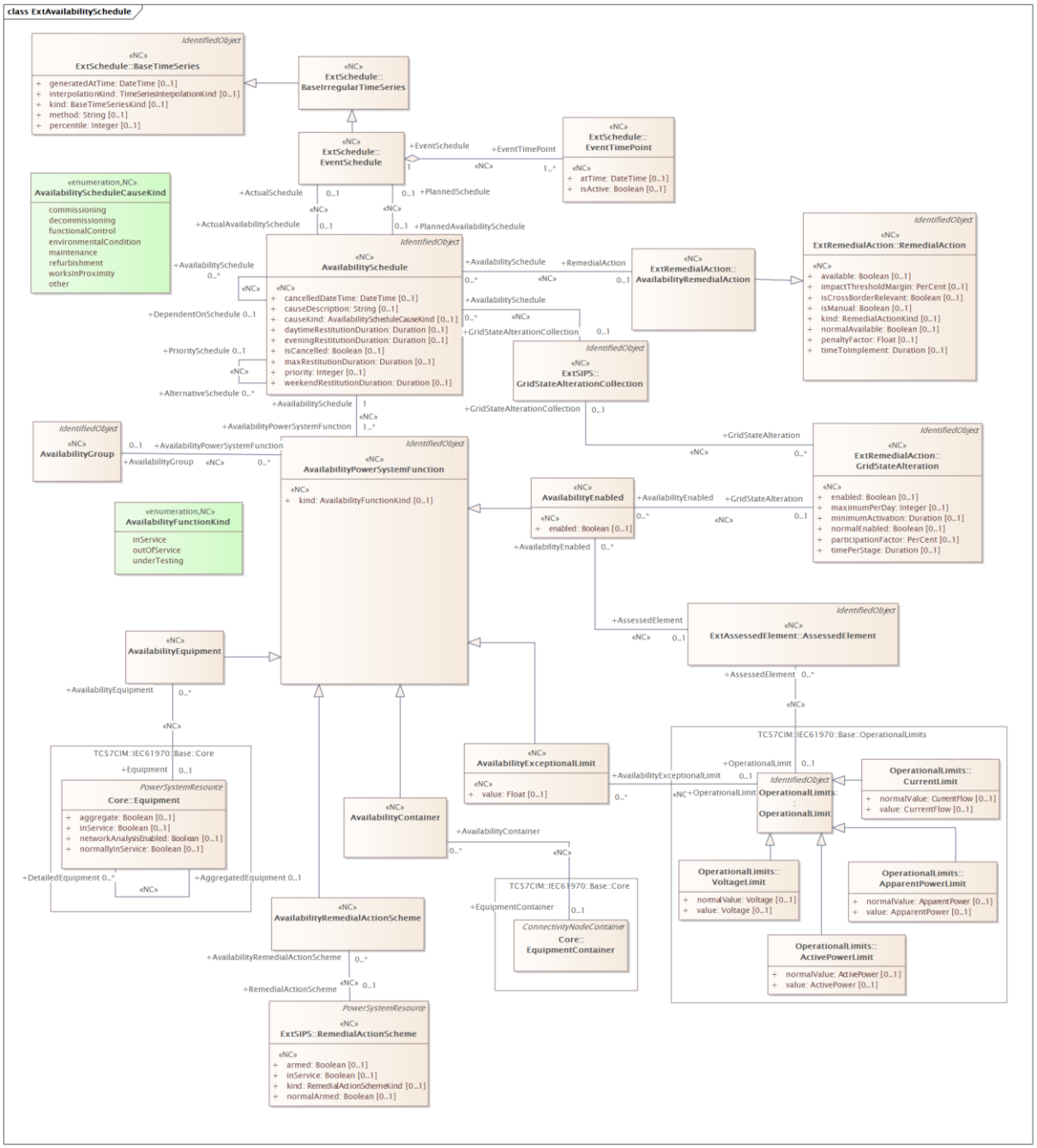

Figure 5 – Class diagram ExtAvailabilitySchedule::ExtAvailabilitySchedule

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

3.5.2 (NC) AvailabilityEnabled

Inheritance path = AvailabilityPowerSystemFunction : IdentifiedObject : ExtEuIdentifiedObject
Availability enabled is enabling or disabling grid state alteration (e.g. tap position action) or assessed element that is related to the availability schedule. For instance, the cancellation of availability schedule can lead to changes in the assessed element. This is done by enabling one assessment and disabling another.
Table 48 shows all attributes of AvailabilityEnabled.

Table 48 – Attributes of ExtAvailabilitySchedule::AvailabilityEnabled

name	mult	type	description
enabled	0..1	Boolean	(NC) Instruction to enable or disable alteration and assessment.
kind	0..1	AvailabilityFunctionKind	(NC) inherited from: AvailabilityPowerSystemFunction
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

Table 49 shows all association ends of AvailabilityEnabled with other classes.

Table 49 – Association ends of ExtAvailabilitySchedule::AvailabilityEnabled with other classes

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

3.5.3 (NC) AvailabilityContainer

Inheritance path = AvailabilityPowerSystemFunction : IdentifiedObject : ExtEuIdentifiedObject
Availability container serves for associating an equipment container with an availability schedule. For instance, putting in or out of service all the equipment inside a Line or a Bay in combination with other availability functions with the same availability schedule.
Table 50 shows all attributes of AvailabilityContainer.

Table 50 – Attributes of ExtAvailabilitySchedule::AvailabilityContainer

name	mult	type	description
kind	0..1	AvailabilityFunctionKind	(NC) inherited from: AvailabilityPowerSystemFunction
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 51 shows all association ends of AvailabilityContainer with other classes.

Table 51 – 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	AvailabilityGroup	(NC) inherited from: AvailabilityPowerSystemFunction
1..*	AvailabilitySchedule	1..1	AvailabilitySchedule	(NC) inherited from: AvailabilityPowerSystemFunction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.5.4 (NC) AvailabilityEquipment

Inheritance path = AvailabilityPowerSystemFunction : IdentifiedObject : ExtEuIdentifiedObject
Availability equipment serves for associating an equipment with an availability schedule. For instance, putting in or out of service an ACLineSegment in combination with other availability functions with the same availability schedule.
Table 52 shows all attributes of AvailabilityEquipment.

Table 52 – Attributes of ExtAvailabilitySchedule::AvailabilityEquipment

name	mult	type	description
kind	0..1	AvailabilityFunctionKind	(NC) inherited from: AvailabilityPowerSystemFunction
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

Table 53 shows all association ends of AvailabilityEquipment with other classes.

Table 53 – Association ends of ExtAvailabilitySchedule::AvailabilityEquipment with 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	AvailabilityGroup	(NC) inherited from: AvailabilityPowerSystemFunction
1..*	AvailabilitySchedule	1..1	AvailabilitySchedule	(NC) inherited from: AvailabilityPowerSystemFunction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.5.5 (NC) AvailabilityExceptionalLimit

Inheritance path = AvailabilityPowerSystemFunction : IdentifiedObject : ExtEuIdentifiedObject
Availability exceptional limit serves for associating an operational limit restriction with an availability schedule. For instance, enabling or disabling the current limit on ACLineSegment terminal in combination with other availability functions with the same availability schedule or de-rating due to fault.
Table 54 shows all attributes of AvailabilityExceptionalLimit.

Table 54 – Attributes of ExtAvailabilitySchedule::AvailabilityExceptionalLimit

name	mult	type	description
value	0..1	Float	(NC) Value for the referred operational limit.
kind	0..1	AvailabilityFunctionKind	(NC) inherited from: AvailabilityPowerSystemFunction
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

Table 55 shows all association ends of AvailabilityExceptionalLimit with other classes.

Table 55 – Association ends of ExtAvailabilitySchedule::AvailabilityExceptionalLimit 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	AvailabilityGroup	(NC) inherited from: AvailabilityPowerSystemFunction
1..*	AvailabilitySchedule	1..1	AvailabilitySchedule	(NC) inherited from: AvailabilityPowerSystemFunction

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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.5.6 (NC) AvailabilityGroup

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Container to link relevant equipment that is affected by (un)availability schedule across availability coordinator (e.g. TSO-TSO, TSO-DSO or DSO-DSO).
Table 56 shows all attributes of AvailabilityGroup.

Table 56 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 57 shows all association ends of AvailabilityGroup with other classes.

Table 57 – Association ends of ExtAvailabilitySchedule::AvailabilityGroup with other classes

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

3.5.7 (NC) AvailabilityPowerSystemFunction

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

topology changes affected by a function taken out of service, e.g. open switches on both end of a ACLineSegment when the ACLineSegment is taken out of service. More complex changes, like change regulation set point, must be described in the linked GridStateAlterationCollection. Table 58 shows all attributes of AvailabilityPowerSystemFunction.

Table 58 – Attributes of ExtAvailabilitySchedule::AvailabilityPowerSystemFunction

name	mult	type	description
kind	0..1	AvailabilityFunctionKind	(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

Table 59 shows all association ends of AvailabilityPowerSystemFunction with other classes.

Table 59 – Association ends of ExtAvailabilitySchedule::AvailabilityPowerSystemFunction with other classes

mult from	name	mult to	type	description
0..*	AvailabilityGroup	0..1	AvailabilityGroup	(NC) Grouping for all availability power system functions (controlled by all relevant system operators) that have the same availability schedule.
1..*	AvailabilitySchedule	1..1	AvailabilitySchedule	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.5.8 (NC) AvailabilityRemedialActionScheme

Inheritance path = AvailabilityPowerSystemFunction : IdentifiedObject : ExtEuIdentifiedObject
Availability remedial action scheme serves for associating a remedial action scheme with an availability schedule. For instance, taking in or out of service a SIPS / SPS due to communication issue, in combination with other availability functions with the same availability schedule.
Table 60 shows all attributes of AvailabilityRemedialActionScheme.

Table 60 – Attributes of ExtAvailabilitySchedule::AvailabilityRemedialActionScheme

name	mult	type	description
kind	0..1	AvailabilityFunctionKind	(NC) inherited from: AvailabilityPowerSystemFunction
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

Table 61 shows all association ends of AvailabilityRemedialActionScheme with other classes.

Table 61 – Association ends of ExtAvailabilitySchedule::AvailabilityRemedialActionScheme with other classes

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

3.5.9 (NC) AvailabilitySchedule

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
A given (un)availability schedule with a given status and cause that include multiple equipment that need to follow the same scheduling periods.
Table 62 shows all attributes of AvailabilitySchedule.

Table 62 – 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	AvailabilityScheduleCauseKind	(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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 63 shows all association ends of AvailabilitySchedule with other classes.

Table 63 – Association ends of ExtAvailabilitySchedule::AvailabilitySchedule with other classes

mult from	name	mult to	type	description
1..1	AvailabilityPowerSystemFunction	1..*	AvailabilityPowerSystemFunction	(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	AvailabilityRemedialAction	(NC) Remedial action that is cancelling this availability schedule.
0..1	ActualSchedule	0..1	EventSchedule	(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	EventSchedule	(NC) Planned schedule that relates to this availability schedule used for planning availability (e.g., to compare planned vs. actual).
0..*	DependentOnSchedule	0..1	AvailabilitySchedule	(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..*	AvailabilitySchedule	(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	GridStateAlterationCollection	(NC) The grid state alteration collection that has this availability schedule.
0..1	PowerSystemProject	0..1	PowerSystemProject	(NC) The power system project that has this availability schedule.
0..1	AvailabilitySchedule	0..*	AvailabilitySchedule	(NC) Availability schedule that has a dependent availability schedule.
0..*	PrioritySchedule	0..1	AvailabilitySchedule	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.5.10 (NC) AvailabilityFunctionKind enumeration

Kind of availability that is affecting the function.
Table 64 shows all literals of AvailabilityFunctionKind.

Table 64 – 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.

3.5.11 (NC) AvailabilityScheduleCauseKind enumeration

The kinds of cause of the (un)availability schedule.
Table 65 shows all literals of AvailabilityScheduleCauseKind.

Table 65 – 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.

3.6 Contingency extensions

3.6.1 General

This package contains the extensions related to the contingency.

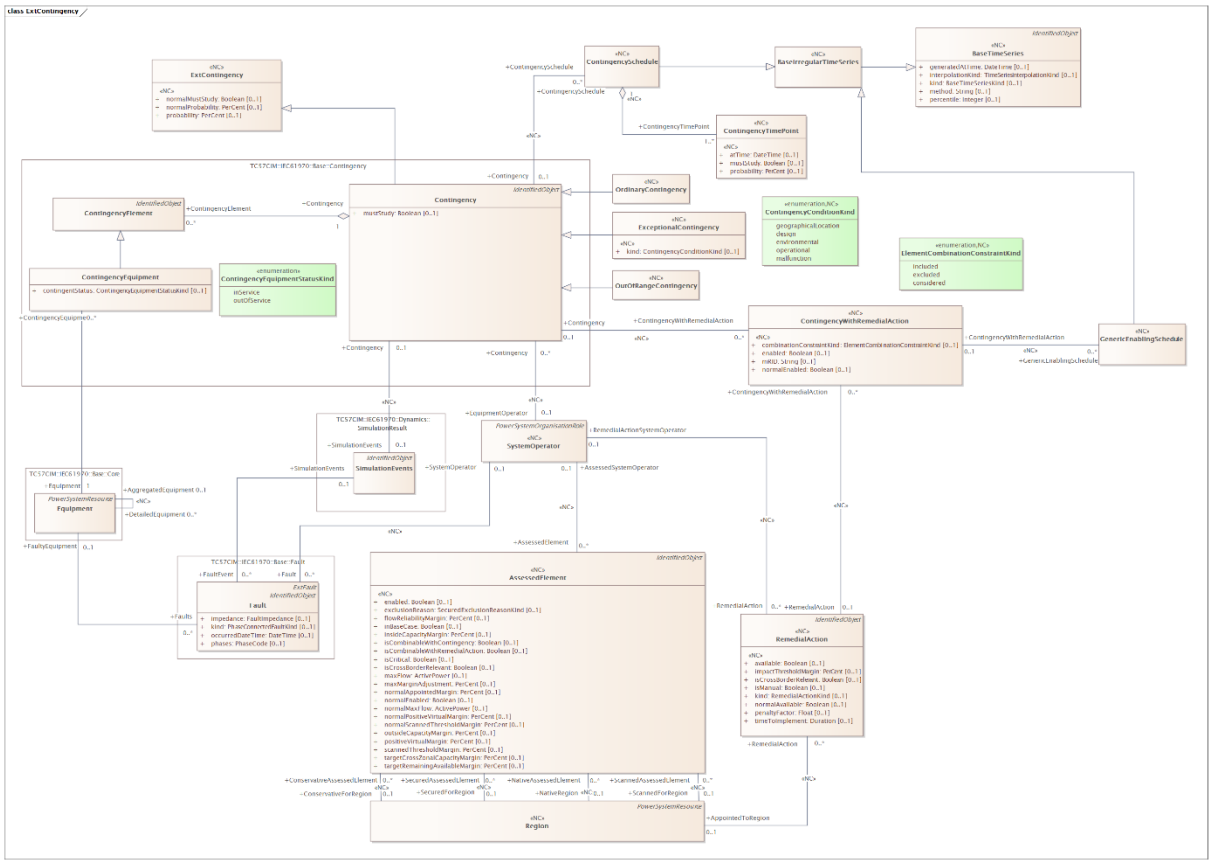

Figure 6 – Class diagram ExtContingency::ExtContingency

Figure 6: The diagram contains classes related to the contingency.

3.6.2 (NC) ContingencyWithRemedialAction root class

Combination of a contingency and a remedial action. ContingencyWithRemedialAction shall not be instantiated for preventive RemedialAction (RemedialAction.kind equals RemedialActionKind.preventive).

Table 66 shows all attributes of ContingencyWithRemedialAction.

Table 66 – 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	ElementCombinationConstraintKind	(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 action should not be used for this contingency.

name	mult	type	description
			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.

Table 67 shows all association ends of ContingencyWithRemedialAction with other classes.

Table 67 – Association ends of ExtContingency::ContingencyWithRemedialAction with 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	RemedialAction	(NC) The remedial action defined for this contingency and remedial action combination.
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) Enabling schedule associated to a contingency with remedial action.

3.6.3 (NC) ExceptionalContingency

Inheritance path = Contingency : IdentifiedObject : ExtEuIdentifiedObject : ExtContingency

Exceptional contingency means the simultaneous occurrence of multiple contingencies with a common cause.

Table 68 shows all attributes of ExceptionalContingency.

Table 68 – Attributes of ExtContingency::ExceptionalContingency

name	mult	type	description
kind	0..1	ContingencyConditionKind	(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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
normalProbability	0..1	PerCent	(NC) inherited from: ExtContingency
normalMustStudy	0..1	Boolean	(NC) inherited from: ExtContingency
probability	0..1	PerCent	(NC) inherited from: ExtContingency

Table 69 shows all association ends of ExceptionalContingency with other classes.

Table 69 – Association ends of ExtContingency::ExceptionalContingency with other classes

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

3.6.4 (NC) ExtContingency root class

Specifies the forecasted probability of the occurrence of the contingency based on the given operational condition, status of the equipment and the forecasted environment condition. Table 70 shows all attributes of ExtContingency.

Table 70 – 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].

3.6.5 (NC) OrdinaryContingency

Inheritance path = Contingency : IdentifiedObject : ExtEuIdentifiedObject : ExtContingency
Ordinary contingency means the occurrence of a contingency of a single branch or injection. Table 71 shows all attributes of OrdinaryContingency.

Table 71 – 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

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
normalProbability	0..1	PerCent	(NC) inherited from: ExtContingency
normalMustStudy	0..1	Boolean	(NC) inherited from: ExtContingency
probability	0..1	PerCent	(NC) inherited from: ExtContingency

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

Table 72 – 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	SimulationEvents	0..1	SimulationEvents	(NC) inherited from: Contingency
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.6.6 (NC) OutOfRangeContingency

Inheritance path = Contingency : IdentifiedObject : ExtEuIdentifiedObject : ExtContingency

Out of range means the simultaneous occurrence of multiple contingencies without a common cause, or a loss of power generating modules with a total loss of generation capacity exceeding the reference incident.

Table 73 shows all attributes of OutOfRangeContingency.

Table 73 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
normalProbability	0..1	PerCent	(NC) inherited from: ExtContingency
normalMustStudy	0..1	Boolean	(NC) inherited from: ExtContingency
probability	0..1	PerCent	(NC) inherited from: ExtContingency

Table 74 shows all association ends of OutOfRangeContingency with other classes.

Table 74 – Association ends of ExtContingency::OutOfRangeContingency with other classes

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

3.6.7 (NC) ContingencyConditionKind enumeration

Kinds of occurrence criteria of application.
Table 75 shows all literals of ContingencyConditionKind.

Table 75 – 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.

3.7 Package ExtDirectCurent

3.7.1 General

This package contains the extensions related to the direct current (DC).

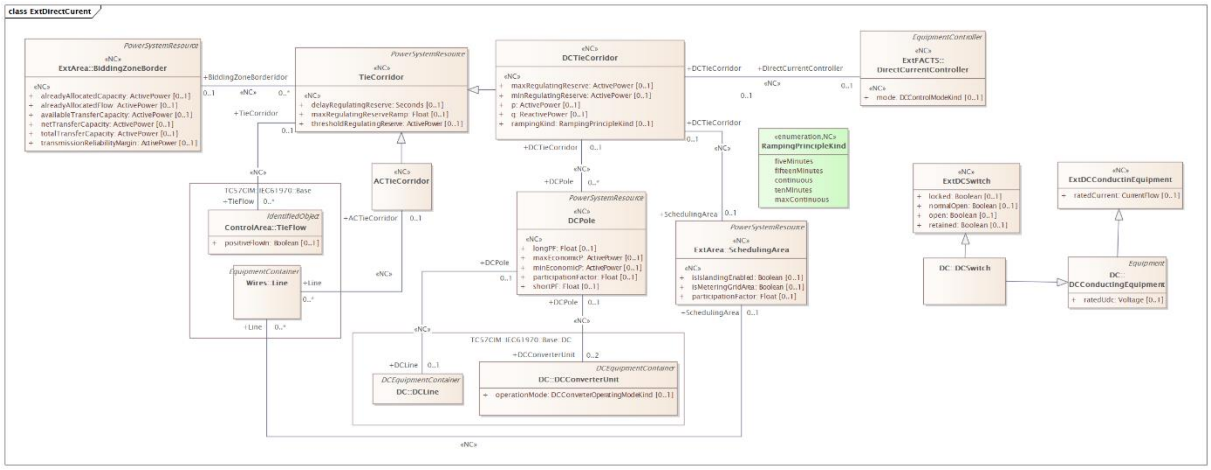

Figure 7 – Class diagram ExtDirectCurent::ExtDirectCurent

Figure 7: The diagram contains classes related to direct current.

3.7.2 (NC) ACTieCorridor

Inheritance path = TieCorridor : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

A collection of one or more AC tie lines that connect two different control areas.

Table 76 shows all attributes of ACTieCorridor.

Table 76 – Attributes of ExtDirectCurent::ACTieCorridor

name	mult	type	description
delayRegulatingReserve	0..1	Seconds	(NC) inherited from: TieCorridor
maxRegulatingReserveRamp	0..1	Float	(NC) inherited from: TieCorridor
thresholdRegulatingReserve	0..1	ActivePower	(NC) inherited from: TieCorridor
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

Table 77 shows all association ends of ACTieCorridor with other classes.

Table 77 – 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..*	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) inherited from: TieCorridor
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) inherited from: TieCorridor
0..1	AreaDispatchableUnit	0..*	AreaDispatchableUnit	(NC) inherited from: TieCorridor
0..1	TieFlow	0..*	TieFlow	(NC) inherited from: TieCorridor
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.7.3 (NC) DCPole

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

The direct current (DC) pole is the circuit which includes converter units from both sides and the relevant direct current line. This forms the smallest unit of transmission control. Table 78 shows all attributes of DCPole.

Table 78 – Attributes of ExtDirectCurent::DCPole

name	mult	type	description
longPF	0..1	Float	(NC) Energy consumer long term economic participation factor.
shortPF	0..1	Float	(NC) Energy consumer short term economic participation factor.
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.
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/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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 79 shows all association ends of DCPole with other classes.

Table 79 – Association ends of ExtDirectCurent::DCPole with other classes

mult from	name	mult to	type	description
0..1	DCLine	0..1	DCLine	(NC) The DC line that is related to this DC pole.
0..1	DCConverterUnit	0..2	DCConverterUnit	(NC) The DC converter unit that relates to this DC pole.
0..*	DCTieCorridor	0..1	DCTieCorridor	(NC) The DCTieCorridor 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

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

3.7.4 (NC) DCTieCorridor

Inheritance path = TieCorridor : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 80 shows all attributes of DCTieCorridor.

Table 80 – 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	RampingPrincipleKind	(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: TieCorridor
maxRegulatingReserveRamp	0..1	Float	(NC) inherited from: TieCorridor
thresholdRegulatingReserve	0..1	ActivePower	(NC) inherited from: TieCorridor
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

Table 81 shows all association ends of DCTieCorridor with other classes.

Table 81 – Association ends of ExtDirectCurent::DCTieCorridor with other classes

mult from	name	mult to	type	description
0..1	AssessedElement	0..*	AssessedElement	(NC) The assessed element indicating that the DC tie corridor is assessed, i.e. monitored.

mult from	name	mult to	type	description
0..1	MustRunSchedule	0..*	MustRunSchedule	(NC) Must run schedule which has DC tie corridors.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which has DC tie corridors.
0..1	SchedulingArea	0..1	SchedulingArea	(NC) The scheduling area that has this DC tie corridor.
0..1	DCPole	0..*	DCPole	(NC) The DCPole which is part of the DC link/corridor.
0..1	DirectCurrentController	0..1	DirectCurrentController	(NC) Direct current controller for this DCTieCorridor.
0..*	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) inherited from: TieCorridor
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) inherited from: TieCorridor
0..1	AreaDispatchableUnit	0..*	AreaDispatchableUnit	(NC) inherited from: TieCorridor
0..1	TieFlow	0..*	TieFlow	(NC) inherited from: TieCorridor
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.7.5 (NC) ExtDCConductinEquipment root class

European network codes extension to base CIM counterpart.
Table 82 shows all attributes of ExtDCConductinEquipment.

Table 82 – 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.

3.7.6 (NC) ExtDCSwitch root class

European network codes extension to base CIM counterpart.
Table 83 shows all attributes of ExtDCSwitch.

Table 83 – 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

name	mult	type	description
			Discrete.normalValue is expected to match with the DCSwitch.normalOpen.
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.

3.7.7 (NC) TieCorridor

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 84 shows all attributes of TieCorridor.

Table 84 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 85 shows all association ends of TieCorridor with other classes.

Table 85 – Association ends of ExtDirectCurent::TieCorridor with other classes

mult from	name	mult to	type	description
0..*	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) Bidding zone border in which the tie corridor is located.
0..*	LoadFrequencyControlArea	0..1	LoadFrequencyControlArea	(NC) LoadFrequencyControlArea controlling the TieCorridor.
0..1	AreaDispatchableUnit	0..*	AreaDispatchableUnit	(NC) AreaDispatchableUnit for the Tie Corridor.

mult from	name	mult to	type	description
0..1	TieFlow	0..*	TieFlow	(NC) Tie flow which belongs to 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.7.8 (NC) RampingPrincipleKind enumeration

Kind of ramping principle.
Table 86 shows all literals of RampingPrincipleKind.

Table 86 – 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 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).

3.8 Package ExtEquivalent

This package contains the extensions related to the equivalents.

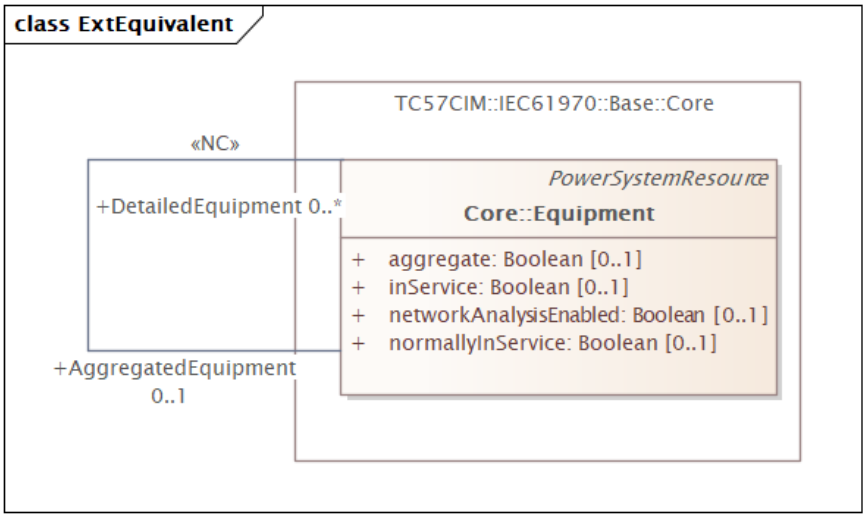

Figure 8 – Class diagram ExtEquivalent::ExtEquivalent

Figure 8: The diagram contains association related to equipment.

3.9 Package ExtFACTS

3.9.1 General

This package contains the extensions related to the FACTS.

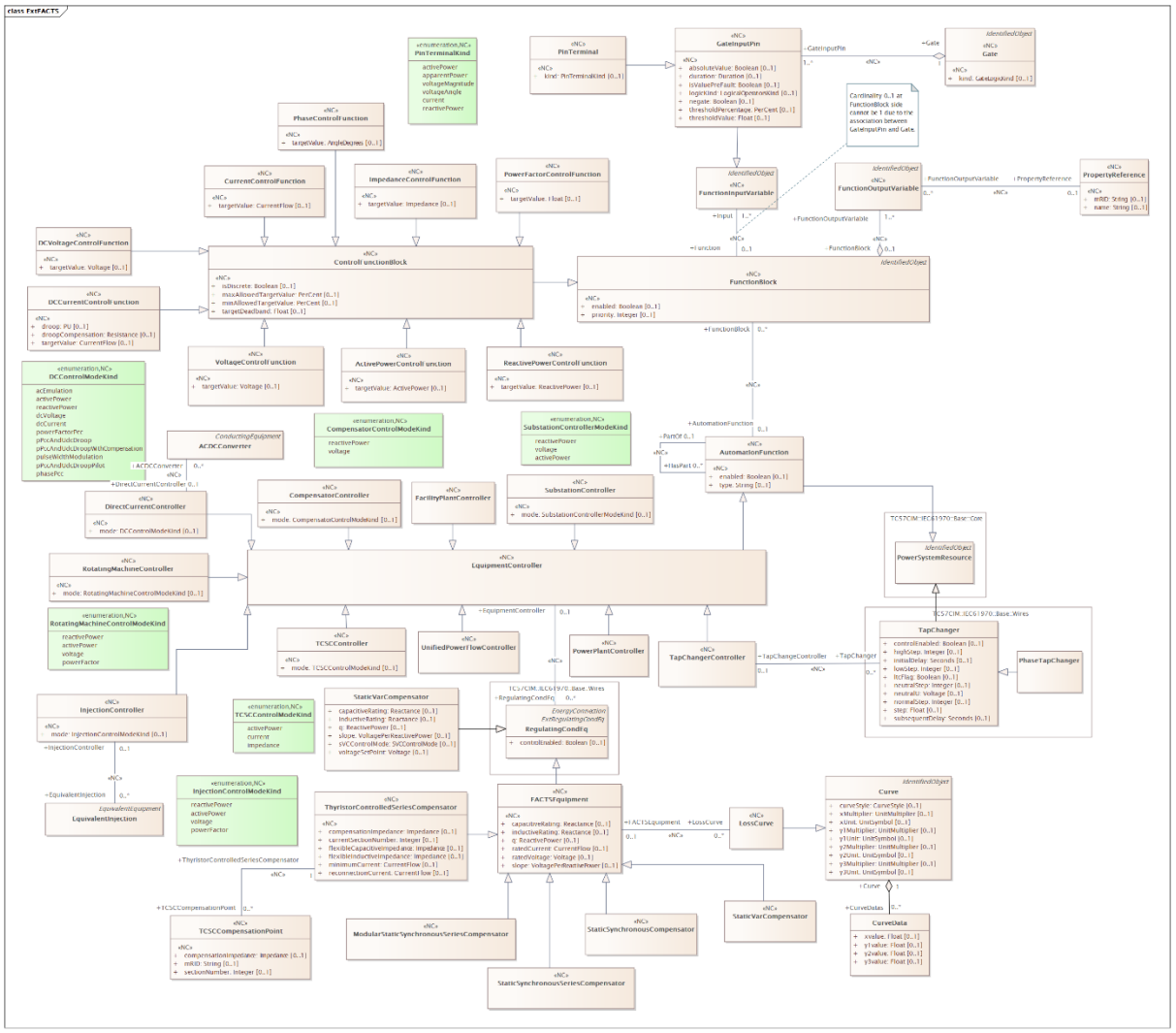

Figure 9 – Class diagram ExtFACTS::ExtFACTS

Figure 9: The diagram contains association related to FACTS.

3.9.2 (NC) ActivePowerControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

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

Table 87 shows all attributes of ActivePowerControlFunction.

Table 87 – Attributes of ExtFACTS::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: ControlFunctionBlock
targetDeadband	0..1	Float	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock

name	mult	type	description
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
priority	0..1	Integer	(NC) inherited from: FunctionBlock
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

Table 88 shows all association ends of ActivePowerControlFunction with other classes.

Table 88 – Association ends of ExtFACTS::ActivePowerControlFunction with other classes

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.3 (NC) AutomationFunction

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Automation function is a collection of functional block or other automation function that can be executed as a work cycle program as part of an automated system.
Table 89 shows all attributes of AutomationFunction.

Table 89 – Attributes of ExtFACTS::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.
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

Table 90 shows all association ends of AutomationFunction with other classes.

Table 90 – Association ends of ExtFACTS::AutomationFunction with other classes

mult from	name	mult to	type	description
0..1	HasPart	0..*	AutomationFunction	(NC) Automation function has this automation function as a part.
0..1	FunctionBlock	0..*	FunctionBlock	(NC) Function block is part of this automation function.
0..*	PartOf	0..1	AutomationFunction	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.4 (NC) CompensatorController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 91 shows all attributes of CompensatorController.

Table 91 – Attributes of ExtFACTS::CompensatorController

name	mult	type	description
mode	0..1	CompensatorControlModeKind	(NC) Mode of the compensator controller.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
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

Table 92 shows all association ends of CompensatorController with other classes.

Table 92 – Association ends of ExtFACTS::CompensatorController with other classes

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController

mult from	name	mult to	type	description
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.5 (NC) ControlFunctionBlock

Inheritance path = FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

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

Table 93 shows all attributes of ControlFunctionBlock.

Table 93 – Attributes of ExtFACTS::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. The allowed value range is [0,100].
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
priority	0..1	Integer	(NC) inherited from: FunctionBlock
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

Table 94 shows all association ends of ControlFunctionBlock with other classes.

Table 94 – Association ends of ExtFACTS::ControlFunctionBlock with other classes

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) The action that is applied to this control function block.
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.6 (NC) DCCurrentControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

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

Table 95 shows all attributes of DCCurrentControlFunction.

Table 95 – Attributes of ExtFACTS::DCCurrentControlFunction

name	mult	type	description
droop	0..1	PU	(NC) Droop constant. The pu value is obtained as D [kV/MW] x Sb / Ubdc. 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: ControlFunctionBlock
targetDeadband	0..1	Float	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
priority	0..1	Integer	(NC) inherited from: FunctionBlock
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 96 shows all association ends of DCCurrentControlFunction with other classes.

Table 96 – Association ends of ExtFACTS::DCCurrentControlFunction with other classes

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.7 (NC) DCVoltageControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

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

Table 97 shows all attributes of DCVoltageControlFunction.

Table 97 – Attributes of ExtFACTS::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: ControlFunctionBlock
targetDeadband	0..1	Float	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
priority	0..1	Integer	(NC) inherited from: FunctionBlock
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 98 shows all association ends of DCVoltageControlFunction with other classes.

Table 98 – Association ends of ExtFACTS::DCVoltageControlFunction with other classes

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.8 (NC) DirectCurrentController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Power flow controller for direct current that can be used in high-voltage direct current grids and for low-voltage direct current microgrids. It uses a high-frequency isolated dc-dc converter cascaded with a controllable full-bridge inverter that creates a small bipolar voltage in series with the line. The controller can control the power and compensate for accumulated voltage drop in a distribution line.

Table 99 shows all attributes of DirectCurrentController.

Table 99 – Attributes of ExtFACTS::DirectCurrentController

name	mult	type	description
mode	0..1	DCControlModeKind	(NC) Mode of the dc controller.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
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

Table 100 shows all association ends of DirectCurrentController with other classes.

1736 **Table 100 – Association ends of ExtFACTS::DirectCurrentController with other classes**

mult from	name	mult to	type	description
0..1	DCTieCorridor	0..1	DCTieCorridor	(NC) DCTieCorridor controlled by this direct current controller.
0..1	ACDCConverter	0..*	ACDCConverter	(NC) ACDC converter controlled by the direct current controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

1737

1738 ### 3.9.9 (NC) EquipmentController

1739 Inheritance path = AutomationFunction : PowerSystemResource : IdentifiedObject :
1740 ExtEuIdentifiedObject
1741 Equipment controller is an automation function that can control one or multiple equipment
1742 function to achieve all the targets inside the given tolerance.
1743 Table 101 shows all attributes of EquipmentController.

1744 **Table 101 – Attributes of ExtFACTS::EquipmentController**

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
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

1745
1746 Table 102 shows all association ends of EquipmentController with other classes.

Table 102 – Association ends of ExtFACTS::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..*	EquipmentControllerAction	(NC) Equipment controller action for this equipment controller.
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.10 (NC) FacilityPlantController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Facility plant controller is controlling the equipment to optimize the facility plant.

Table 103 shows all attributes of FacilityPlantController.

Table 103 – Attributes of ExtFACTS::FacilityPlantController

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
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

Table 104 shows all association ends of FacilityPlantController with other classes.

Table 104 – Association ends of ExtFACTS::FacilityPlantController with other classes

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController

mult from	name	mult to	type	description
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.11 (NC) FACTSEquipment

Inheritance path = RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Flexible Alternating Current Transmission System regulating equipment.

Table 105 shows all attributes of FACTSEquipment.

Table 105 – Attributes of ExtFACTS::FACTSEquipment

name	mult	type	description
capacitiveRating	0..1	Reactance	(NC) Capacitive reactance at maximum reactive power. Shall always be positive.
inductiveRating	0..1	Reactance	(NC) Inductive rating at maximum inductive reactive power. Shall always be negative.
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.
ratedCurrent	0..1	CurrentFlow	(NC) Rated current of the FACTS equipment.
ratedVoltage	0..1	Voltage	(NC) Rated voltage of the FACTS equipment.
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

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 106 shows all association ends of FACTSEquipment with other classes.

Table 106 – Association ends of ExtFACTS::FACTSEquipment with other classes

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

3.9.12 (NC) FunctionBlock

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Function block is a function described as a set of elementary blocks. The blocks describe the function between input variables and output variables.
Table 107 shows all attributes of FunctionBlock.

Table 107 – Attributes of ExtFACTS::FunctionBlock

name	mult	type	description
enabled	0..1	Boolean	(NC) True, if the function block is enabled (active). Otherwise false.
priority	0..1	Integer	(NC) Value 0 means ignore priority. 1 means the highest priority, 2 is the second highest priority.
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

Table 108 shows all association ends of FunctionBlock with other classes.

Table 108 – Association ends of ExtFACTS::FunctionBlock with other classes

mult from	name	mult to	type	description
0..*	AutomationFunction	0..1	AutomationFunction	(NC) Automation function describe automation that this function block is part of.
0..1	Input	1..*	FunctionInputVariable	(NC) Function input variable describe the input or domain to the function block.
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) Function output variable describe the output or codomain to the function block.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.13 (NC) FunctionInputVariable

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Functional input variable defines the domain of the function.
Table 109 shows all attributes of FunctionInputVariable.

Table 109 – Attributes of ExtFACTS::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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 110 shows all association ends of FunctionInputVariable with other classes.

Table 110 – Association ends of ExtFACTS::FunctionInputVariable with other classes

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

3.9.14 (NC) FunctionOutputVariable

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Functional output variable defines the codomain of the function.
Table 111 shows all attributes of FunctionOutputVariable.

Table 111 – Attributes of ExtFACTS::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	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 112 shows all association ends of FunctionOutputVariable with other classes.

Table 112 – Association ends of ExtFACTS::FunctionOutputVariable with other classes

mult from	name	mult to	type	description
1..*	FunctionBlock	0..1	FunctionBlock	(NC) Function block describe the function that function output variable provides the codomain for.
0..*	PropertyReference	0..1	PropertyReference	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.15 (NC) CurrentControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject
Current control function is a function block that calculates the operating point of the controlled equipment to achieve the target current.

Table 113 shows all attributes of CurrentControlFunction.

Table 113 – Attributes of ExtFACTS::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: ControlFunctionBlock
targetDeadband	0..1	Float	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
priority	0..1	Integer	(NC) inherited from: FunctionBlock
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

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

Table 114 – Association ends of ExtFACTS::CurrentControlFunction with other classes

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.16 (NC) ImpedanceControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

Impedance control function is a function block that calculates the operating point of the controlled equipment to achieve the target impedance.

Table 115 shows all attributes of ImpedanceControlFunction.

Table 115 – Attributes of ExtFACTS::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: ControlFunctionBlock
targetDeadband	0..1	Float	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
priority	0..1	Integer	(NC) inherited from: FunctionBlock
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

Table 116 shows all association ends of ImpedanceControlFunction with other classes.

Table 116 – Association ends of ExtFACTS::ImpedanceControlFunction with other classes

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.17 (NC) InjectionController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Injection controller is controlling the equipment which represents an injection or an external network.

Table 117 shows all attributes of InjectionController.

Table 117 – Attributes of ExtFACTS::InjectionController

name	mult	type	description
mode	0..1	InjectionControlModeKind	(NC) Mode of the injection controller.

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
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

Table 118 shows all association ends of InjectionController with other classes.

Table 118 – Association ends of ExtFACTS::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: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.18 (NC) LossCurve

Inheritance path = Curve : IdentifiedObject : ExtEuIdentifiedObject

Represents the losses in the equipment due to operation position.

Table 119 shows all attributes of LossCurve.

Table 119 – 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

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

Table 120 shows all association ends of LossCurve with other classes.

Table 120 – Association ends of ExtFACTS::LossCurve with other classes

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

3.9.19 (NC) ModularStaticSynchronousSeriesCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Modular static synchronous series compensator (MSSSC) is a type of flexible AC transmission system regulating equipment which consists of solid-state voltage source inverter connected in series with a transmission line. This is similar to static synchronous series compensator (SSSC), but without injection transformer. This enables the MSSSC to be truly modular with the ability to simply install a number of equipment in series to provide a desired maximum level of impedance. MSSSC can be dispersed into multiple location in a circuit working collectively under the same controller scheme.

Table 121 shows all attributes of ModularStaticSynchronousSeriesCompensator.

Table 121 – Attributes of ExtFACTS::ModularStaticSynchronousSeriesCompensator

name	mult	type	description
capacitiveRating	0..1	Reactance	(NC) inherited from: FACTSEquipment
inductiveRating	0..1	Reactance	(NC) inherited from: FACTSEquipment
slope	0..1	VoltagePerReactivePower	(NC) inherited from: FACTSEquipment
q	0..1	ReactivePower	(NC) inherited from: FACTSEquipment

name	mult	type	description
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: FACTSEquipment
ratedVoltage	0..1	Voltage	(NC) inherited from: FACTSEquipment
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

Table 122 shows all association ends of ModularStaticSynchronousSeriesCompensator with other classes.

Table 122 – Association ends of ExtFACTS::ModularStaticSynchronousSeriesCompensator with other classes

mult from	name	mult to	type	description
0..1	LossCurve	0..*	LossCurve	(NC) inherited from: FACTSEquipment
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

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

3.9.20 (NC) PhaseControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

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

Table 123 shows all attributes of PhaseControlFunction.

Table 123 – Attributes of ExtFACTS::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: ControlFunctionBlock
targetDeadband	0..1	Float	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
priority	0..1	Integer	(NC) inherited from: FunctionBlock
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

Table 124 shows all association ends of PhaseControlFunction with other classes.

Table 124 – Association ends of ExtFACTS::PhaseControlFunction with other classes

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	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

3.9.21 (NC) PowerFactorControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

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

Table 125 shows all attributes of PowerFactorControlFunction.

Table 125 – Attributes of ExtFACTS::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: ControlFunctionBlock
targetDeadband	0..1	Float	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
priority	0..1	Integer	(NC) inherited from: FunctionBlock
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

Table 126 shows all association ends of PowerFactorControlFunction with other classes.

Table 126 – Association ends of ExtFACTS::PowerFactorControlFunction with other classes

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.22 (NC) PowerPlantController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Power plant controller is controlling the equipment of a power plant.
Table 127 shows all attributes of PowerPlantController.

Table 127 – Attributes of ExtFACTS::PowerPlantController

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
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

Table 128 shows all association ends of PowerPlantController with other classes.

Table 128 – Association ends of ExtFACTS::PowerPlantController with other classes

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.23 (NC) ReactivePowerControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject
Reactive power control function is a function block that calculate the operating point of the controlled equipment to achieve the target reactive power.
Table 129 shows all attributes of ReactivePowerControlFunction.

Table 129 – Attributes of ExtFACTS::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: ControlFunctionBlock
targetDeadband	0..1	Float	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
priority	0..1	Integer	(NC) inherited from: FunctionBlock
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

Table 130 shows all association ends of ReactivePowerControlFunction with other classes.

Table 130 – Association ends of ExtFACTS::ReactivePowerControlFunction with other classes

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.24 (NC) RotatingMachineController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 131 shows all attributes of RotatingMachineController.

Table 131 – Attributes of ExtFACTS::RotatingMachineController

name	mult	type	description
mode	0..1	RotatingMachineControlModeKind	(NC) Mode of the rotating machine controller.

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
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

Table 132 shows all association ends of RotatingMachineController with other classes.

Table 132 – Association ends of ExtFACTS::RotatingMachineController with other classes

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.25 (NC) StaticSynchronousCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Static synchronous compensator (STATCOM), also known as a static synchronous condenser (STATCON), is a type of flexible AC transmission system regulating equipment used on alternating current electricity transmission networks. It is based on a power electronics voltage-source converter and can act as either a source or sink of reactive AC power to an electricity network. If connected to a source of power it can also provide active AC power.

Table 133 shows all attributes of StaticSynchronousCompensator.

Table 133 – Attributes of ExtFACTS::StaticSynchronousCompensator

name	mult	type	description
capacitiveRating	0..1	Reactance	(NC) inherited from: FACTSEquipment
inductiveRating	0..1	Reactance	(NC) inherited from: FACTSEquipment
slope	0..1	VoltagePerReactivePower	(NC) inherited from: FACTSEquipment
q	0..1	ReactivePower	(NC) inherited from: FACTSEquipment
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: FACTSEquipment
ratedVoltage	0..1	Voltage	(NC) inherited from: FACTSEquipment
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

Table 134 shows all association ends of StaticSynchronousCompensator with other classes.

Table 134 – Association ends of ExtFACTS::StaticSynchronousCompensator with other classes

mult from	name	mult to	type	description
0..1	LossCurve	0..*	LossCurve	(NC) inherited from: FACTSEquipment
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

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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.26 (NC) StaticSynchronousSeriesCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 135 shows all attributes of StaticSynchronousSeriesCompensator.

Table 135 – Attributes of ExtFACTS::StaticSynchronousSeriesCompensator

name	mult	type	description
capacitiveRating	0..1	Reactance	(NC) inherited from: FACTSEquipment
inductiveRating	0..1	Reactance	(NC) inherited from: FACTSEquipment
slope	0..1	VoltagePerReactivePower	(NC) inherited from: FACTSEquipment
q	0..1	ReactivePower	(NC) inherited from: FACTSEquipment
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: FACTSEquipment
ratedVoltage	0..1	Voltage	(NC) inherited from: FACTSEquipment
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

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

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

Table 136 – Association ends of ExtFACTS::StaticSynchronousSeriesCompensator with other classes

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

3.9.27 (NC) StaticVarCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

A facility for providing variable and controllable shunt reactive power. The SVC typically consists of a stepdown transformer, filter, thyristor-controlled reactor, and thyristor-switched capacitor arms.

The SVC may operate in fixed MVar output mode or in voltage control mode. When in voltage control mode, the output of the SVC will be proportional to the deviation of voltage at the

controlled bus from the voltage setpoint. The SVC characteristic slope defines the proportion. If the voltage at the controlled bus is equal to the voltage setpoint, the SVC MVar output is zero. Table 137 shows all attributes of StaticVarCompensator.

Table 137 – Attributes of ExtFACTS::StaticVarCompensator

name	mult	type	description
capacitiveRating	0..1	Reactance	(NC) inherited from: FACTSEquipment
inductiveRating	0..1	Reactance	(NC) inherited from: FACTSEquipment
slope	0..1	VoltagePerReactivePower	(NC) inherited from: FACTSEquipment
q	0..1	ReactivePower	(NC) inherited from: FACTSEquipment
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: FACTSEquipment
ratedVoltage	0..1	Voltage	(NC) inherited from: FACTSEquipment
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

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

Table 138 – Association ends of ExtFACTS::StaticVarCompensator with other classes

mult from	name	mult to	type	description
0..1	LossCurve	0..*	LossCurve	(NC) inherited from: FACTSEquipment
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

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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.28 (NC) SubstationController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Substation controller is controlling the equipment to optimize the use of the controlling equipment within a substation.

Table 139 shows all attributes of SubstationController.

Table 139 – Attributes of ExtFACTS::SubstationController

name	mult	type	description
mode	0..1	SubstationControllerModeKind	(NC) Mode of the substation controller.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
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

Table 140 shows all association ends of SubstationController with other classes.

Table 140 – Association ends of ExtFACTS::SubstationController with other classes

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.29 (NC) TapChangerController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Tap changer controller is an equipment controller that controls a tap changer, e.g. how the voltage at the end of a line varies with the load level and compensation of the voltage drop by tap adjustment.

Table 141 shows all attributes of TapChangerController.

Table 141 – Attributes of ExtFACTS::TapChangerController

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
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

Table 142 shows all association ends of TapChangerController with other classes.

Table 142 – Association ends of ExtFACTS::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: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.30 (NC) TCSCCompensationPoint root class

Compensation point of a TCSC compensator.
Table 143 shows all attributes of TCSCCompensationPoint.

Table 143 – Attributes of ExtFACTS::TCSCCompensationPoint

name	mult	type	description
compensationImpedance	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.
sectionNumber	0..1	Integer	(NC) The number of the section.

Table 144 shows all association ends of TCSCCompensationPoint with other classes.

Table 144 – Association ends of ExtFACTS::TCSCCompensationPoint with other classes

mult from	name	mult to	type	description
0..*	ThyristorControlledSeriesCompensator	1..1	ThyristorControlledSeriesCompensator	(NC) TCSC that has different compensation points.

3.9.31 (NC) TCSCController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
TCSC controller is controlling the equipment to optimize the performance of the TCSC.
Table 145 shows all attributes of TCSCController.

Table 145 – Attributes of ExtFACTS::TCSCController

name	mult	type	description
mode	0..1	TCSCControlModeKind	(NC) Mode of the TCSC controller.
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction

name	mult	type	description
type	0..1	String	(NC) inherited from: AutomationFunction
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

Table 146 shows all association ends of TCSCController with other classes.

Table 146 – Association ends of ExtFACTS::TCSCController with other classes

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.32 (NC) ThyristorControlledSeriesCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : EnergyConnection : ConductingEquipment : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Thyristor-controlled series capacitors (TCSC) is a type of flexible AC transmission system regulating equipment that is configured with controlled reactors in parallel with sections of a capacitor bank. This combination allows smooth control of the fundamental frequency capacitive reactance over a wide range. The thyristor valve contains a string of series connected high power thyristors. TCSC can control power flows in order to achieve eliminating of line overloads, reducing loop flows and minimising system losses.

Table 147 shows all attributes of ThyristorControlledSeriesCompensator.

Table 147 – Attributes of ExtFACTS::ThyristorControlledSeriesCompensator

name	mult	type	description
compensationImpedance	0..1	Impedance	(NC) The actual compensation impedance provided by the compensator. The attribute value

name	mult	type	description
			shall be positive if compensation is in the capacitive range. The attribute value shall be negative if compensation is in the inductive rating.
flexibleCapacitiveImpedance	0..1	Impedance	(NC) Flexible impedance that can be controlled by the compensator when operating in the capacitive range. Shall always be positive.
flexibleInductiveImpedance	0..1	Impedance	(NC) Flexible impedance that can be controlled by the compensator when operating in the inductive range. Shall always be negative.
currentSectionNumber	0..1	Integer	(NC) The current section on which the TCSC is operating.
minimumCurrent	0..1	CurrentFlow	(NC) Minimum current below which the device bypassed.
reconnectionCurrent	0..1	CurrentFlow	(NC) The current for which the TCSC returns back to operation after bypass.
capacitiveRating	0..1	Reactance	(NC) inherited from: FACTSEquipment
inductiveRating	0..1	Reactance	(NC) inherited from: FACTSEquipment
slope	0..1	VoltagePerReactivePower	(NC) inherited from: FACTSEquipment
q	0..1	ReactivePower	(NC) inherited from: FACTSEquipment
ratedCurrent	0..1	CurrentFlow	(NC) inherited from: FACTSEquipment
ratedVoltage	0..1	Voltage	(NC) inherited from: FACTSEquipment
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

Table 148 shows all association ends of ThyristorControlledSeriesCompensator with other classes.

Table 148 – Association ends of ExtFACTS::ThyristorControlledSeriesCompensator with other classes

mult from	name	mult to	type	description
1..1	TCSCCompensationPoint	0..*	TCSCCompensationPoint	(NC) Compensation point for this TCSC.
0..1	LossCurve	0..*	LossCurve	(NC) inherited from: FACTSEquipment
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.33 (NC) UnifiedPowerFlowController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

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

Table 149 shows all attributes of UnifiedPowerFlowController.

Table 149 – Attributes of ExtFACTS::UnifiedPowerFlowController

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
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

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

Table 150 – Association ends of ExtFACTS::UnifiedPowerFlowController with other classes

mult from	name	mult to	type	description
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.34 (NC) VoltageControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

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

Table 151 shows all attributes of VoltageControlFunction.

Table 151 – Attributes of ExtFACTS::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: ControlFunctionBlock
targetDeadband	0..1	Float	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
priority	0..1	Integer	(NC) inherited from: FunctionBlock
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

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

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

Table 152 – Association ends of ExtFACTS::VoltageControlFunction with other classes

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.35 (NC) CompensatorControlModeKind enumeration

Kind of compensator controller mode.

Table 153 shows all literals of CompensatorControlModeKind.

Table 153 – Literals of ExtFACTS::CompensatorControlModeKind

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

3.9.36 (NC) InjectionControlModeKind enumeration

Kind of injection controller mode.

Table 154 shows all literals of InjectionControlModeKind.

Table 154 – Literals of ExtFACTS::InjectionControlModeKind

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

3.9.37 (NC) RotatingMachineControlModeKind enumeration

Kind of rotating machine controller mode.

Table 155 shows all literals of RotatingMachineControlModeKind.

Table 155 – Literals of ExtFACTS::RotatingMachineControlModeKind

literal	value	description
reactivePower		Reactive power control.

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

3.9.38 (NC) DCControlModeKind enumeration

Kind of DC control mode.

Table 156 shows all literals of DCControlModeKind.

Table 156 – Literals of ExtFACTS::DCControlModeKind

literal	value	description
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 HVDC links embedded within a single synchronous AC grid. For changes in the phase angle on either station, the response of this control is to 'emulate the behaviour of an AC line' in both steady and transient states. The AC emulation control needs measurement signals for the angles at both ends of the HVDC. 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.
activePower		Control is active power control at AC side, at point of common coupling.
dcVoltage		Control is DC voltage.
dcCurrent		Control is DC current.
reactivePower		Control is reactive power control at AC side, at point of common coupling.
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 HVDC Substations are connected to the HVDC transmission lines. The pilot voltage is then used to coordinate the control the DC voltage across the HVDC substations.
phasePcc		Control is phase at point of common coupling.

3.9.39 (NC) SubstationControllerModeKind enumeration

Kind of substation controller mode.

Table 157 shows all literals of SubstationControllerModeKind.

Table 157 – Literals of ExtFACTS::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..

3.9.40 (NC) TCSCControlModeKind enumeration

Kind of TCSC control mode.
Table 158 shows all literals of TCSCControlModeKind.

Table 158 – Literals of ExtFACTS::TCSCControlModeKind

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

3.9.41 Package ExtSSSC

3.9.41.1 General

This package contains the extensions related to the SSSC.

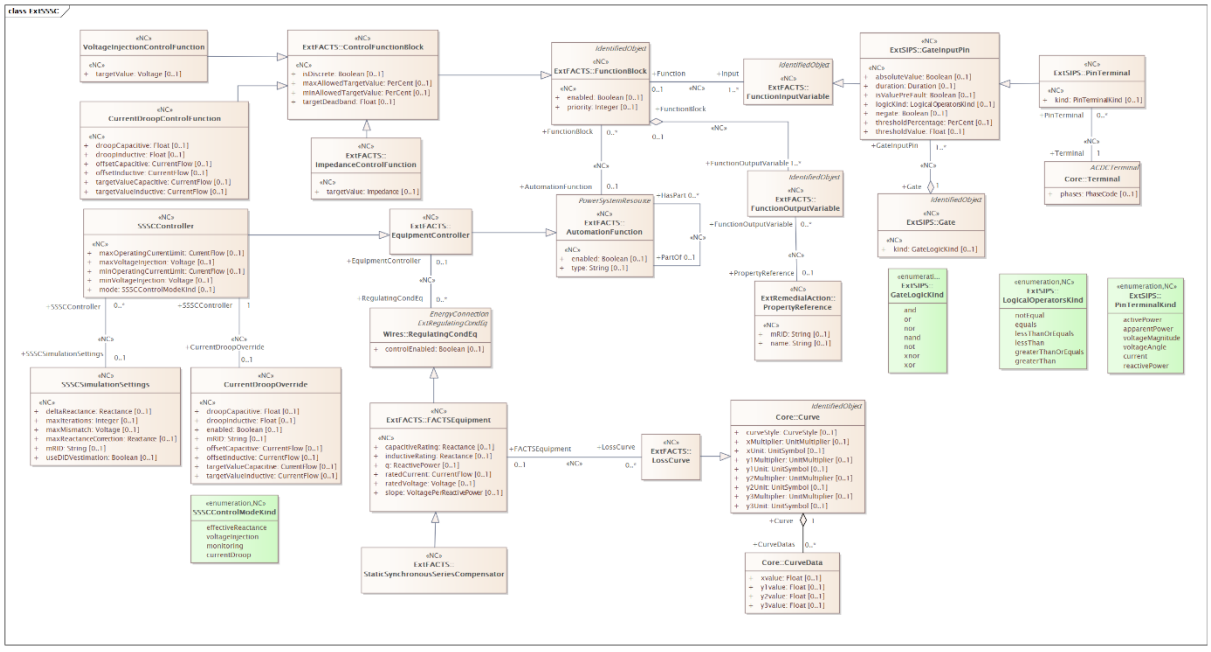

Figure 10 – Class diagram ExtSSSC::ExtSSSC

Figure 10: The diagram shows necessary extensions to model controls of SSSC controller.

3.9.41.2 (NC) CurrentDroopControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject

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

Table 159 shows all attributes of CurrentDroopControlFunction.

Table 159 – Attributes of ExtSSSC::CurrentDroopControlFunction

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: ControlFunctionBlock
targetDeadband	0..1	Float	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
priority	0..1	Integer	(NC) inherited from: FunctionBlock
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

Table 160 shows all association ends of CurrentDroopControlFunction with other classes.

Table 160 – Association ends of ExtSSSC::CurrentDroopControlFunction with other classes

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.41.3 (NC) CurrentDroopOverride root class

Current droop override uses the following logic:
- When the current exceeds a threshold the device executes the following transitions: 1) When injecting an inductive voltage or in monitoring mode the device tends to inject a voltage proportional to the difference between the line current and the aforementioned threshold. 2) When injecting a capacitive voltage the device transitions to monitoring mode.
- If the aforementioned proportional voltage is lower than the initial one, the voltage injection remains unchanged.

Current droop override is not applied when the device operates in currentDroop mode.
Table 161 shows all attributes of CurrentDroopOverride.

Table 161 – Attributes of ExtSSSC::CurrentDroopOverride

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.
offsetCapacitive	0..1	CurrentFlow	(NC) Offset in capacitive region.
offsetInductive	0..1	CurrentFlow	(NC) Offset in capacitive region.
targetValueCapacitive	0..1	CurrentFlow	(NC) Setpoint when control is active in capacitive region.
targetValueInductive	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.

Table 162 shows all association ends of CurrentDroopOverride with other classes.

Table 162 – Association ends of ExtSSSC::CurrentDroopOverride with other classes

mult from	name	mult to	type	description
0..1	SSSCController	1..1	SSSCController	(NC) The SSSC controller to which this CurrentDroopOverride applies to.

3.9.41.4 (NC) SSSCController

Inheritance path = EquipmentController : AutomationFunction : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
The controller of a Static synchronous series compensator (SSSC).
Table 163 shows all attributes of SSSCController.

Table 163 – Attributes of ExtSSSC::SSSCController

name	mult	type	description
mode	0..1	SSSCControlModeKind	(NC) Mode of the Static Synchronous Series compensator controller.

name	mult	type	description
minVoltageInjection	0..1	Voltage	(NC) Minimum voltage that the device can inject.
maxVoltageInjection	0..1	Voltage	(NC) Maximum voltage that the device can inject.
maxOperatingCurrentLimit	0..1	CurrentFlow	(NC) Maximum operating current limit applied for the controller and used by any of the available control functions.
minOperatingCurrentLimit	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: AutomationFunction
type	0..1	String	(NC) inherited from: AutomationFunction
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

Table 164 shows all association ends of SSSCController with other classes.

Table 164 – Association ends of ExtSSSC::SSSCController with other classes

mult from	name	mult to	type	description
1..1	CurrentDroopOverride	0..1	CurrentDroopOverride	(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	SSSCSimulationSettings	(NC) The simulation setings that apply for this controller.
0..1	RegulatingCondEq	0..*	RegulatingCondEq	(NC) inherited from: EquipmentController
1..1	EquipmentControllerAction	0..*	EquipmentControllerAction	(NC) inherited from: EquipmentController
0..1	HasPart	0..*	AutomationFunction	(NC) inherited from: AutomationFunction
0..1	FunctionBlock	0..*	FunctionBlock	(NC) inherited from: AutomationFunction
0..*	PartOf	0..1	AutomationFunction	(NC) inherited from: AutomationFunction
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.41.5 (NC) SSSCSimulationSettings root class

SSSC control simulation settings used by the algorithm for power flow calculations.
Table 165 shows all attributes of SSSCSimulationSettings.

Table 165 – Attributes of ExtSSSC::SSSCSimulationSettings

name	mult	type	description
maxReactanceCorrection	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.
deltaReactance	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.
useDIDVestimation	0..1	Boolean	(NC) Defines if the estimate is considering the dI/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.

Table 166 shows all association ends of SSSCSimulationSettings with other classes.

Table 166 – Association ends of ExtSSSC::SSSCSimulationSettings with other classes

mult from	name	mult to	type	description
0..1	SSSCController	0..*	SSSCController	(NC) The controller that uses these simulation settings.

3.9.41.6 (NC) VoltageInjectionControlFunction

Inheritance path = ControlFunctionBlock : FunctionBlock : IdentifiedObject : ExtEuIdentifiedObject
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 167 shows all attributes of VoltageInjectionControlFunction.

Table 167 – 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: ControlFunctionBlock
targetDeadband	0..1	Float	(NC) inherited from: ControlFunctionBlock
maxAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
minAllowedTargetValue	0..1	PerCent	(NC) inherited from: ControlFunctionBlock
enabled	0..1	Boolean	(NC) inherited from: FunctionBlock
priority	0..1	Integer	(NC) inherited from: FunctionBlock
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

Table 168 shows all association ends of VoltageInjectionControlFunction with other classes.

Table 168 – Association ends of ExtSSSC::VoltageInjectionControlFunction with other classes

mult from	name	mult to	type	description
1..1	ControlFunctionBlockAction	0..*	ControlFunctionBlockAction	(NC) inherited from: ControlFunctionBlock
0..*	AutomationFunction	0..1	AutomationFunction	(NC) inherited from: FunctionBlock
0..1	Input	1..*	FunctionInputVariable	(NC) inherited from: FunctionBlock
0..1	FunctionOutputVariable	1..*	FunctionOutputVariable	(NC) inherited from: FunctionBlock
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.9.41.7 (NC) SSSCControlModeKind enumeration

Control modes of the Static Synchronous Series Compensator (SSSC).
Table 169 shows all literals of SSSCControlModeKind.

Table 169 – 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.

literal	value	description
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.

3.10 Package ExtGLSKs

3.10.1 General

This package contains the extensions related to the generation and load shift keys (GLSKs).

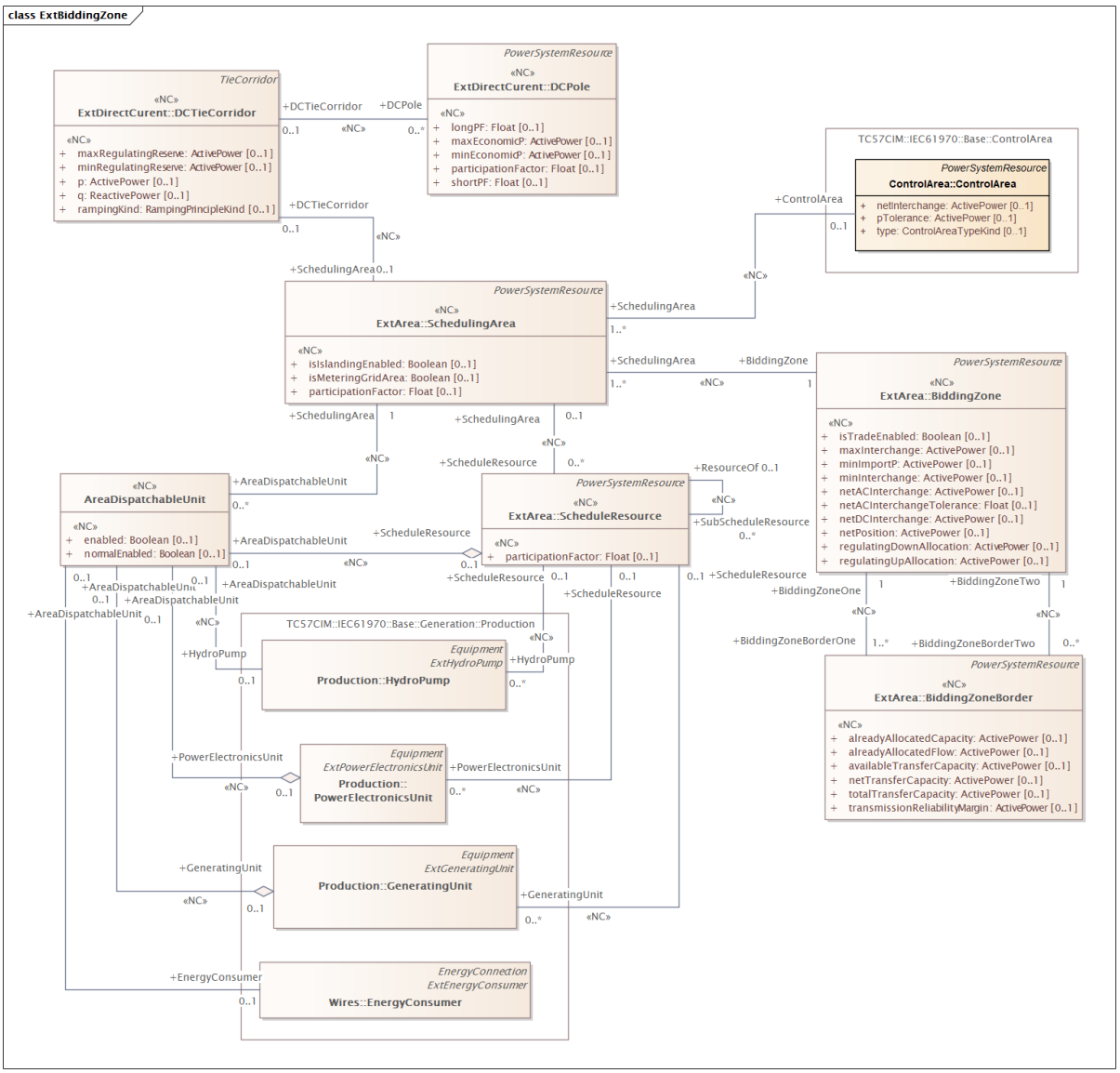

Figure 11 – Class diagram ExtGLSKs::ExtBiddingZone

Figure 11: The diagram contains classes related to bidding zone.

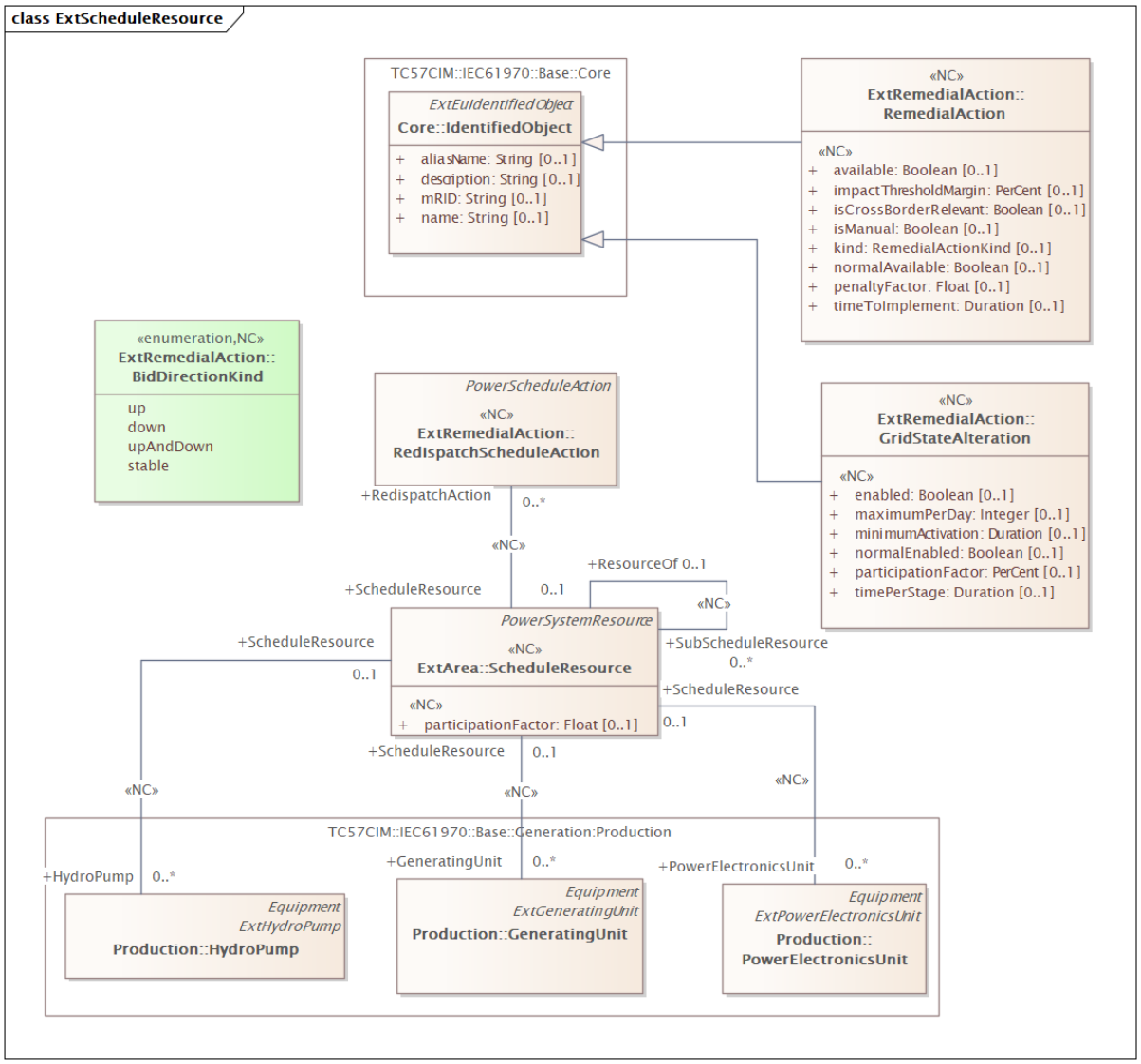

Figure 12 – Class diagram ExtGLSKs::ExtScheduleResource

Figure 12: The diagram contains classes related to schedule resource.

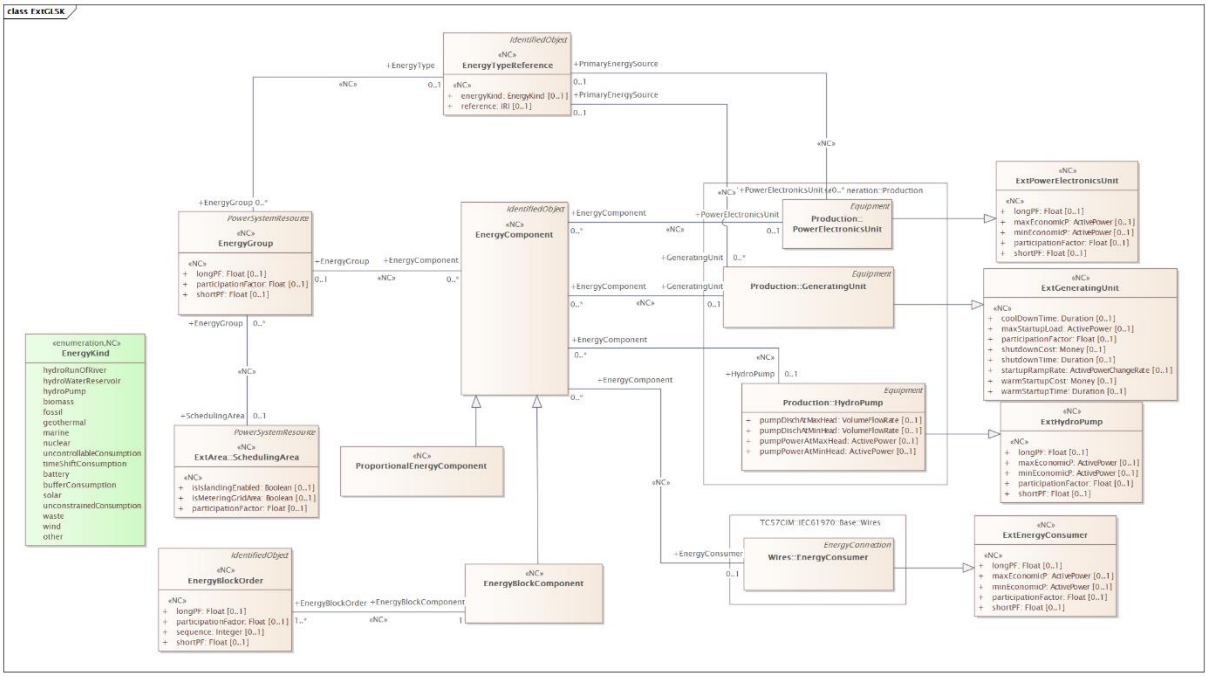

Figure 13 – Class diagram ExtGLSKs::ExtGLSK

Figure 13: The diagram contains classes related to GLSK.

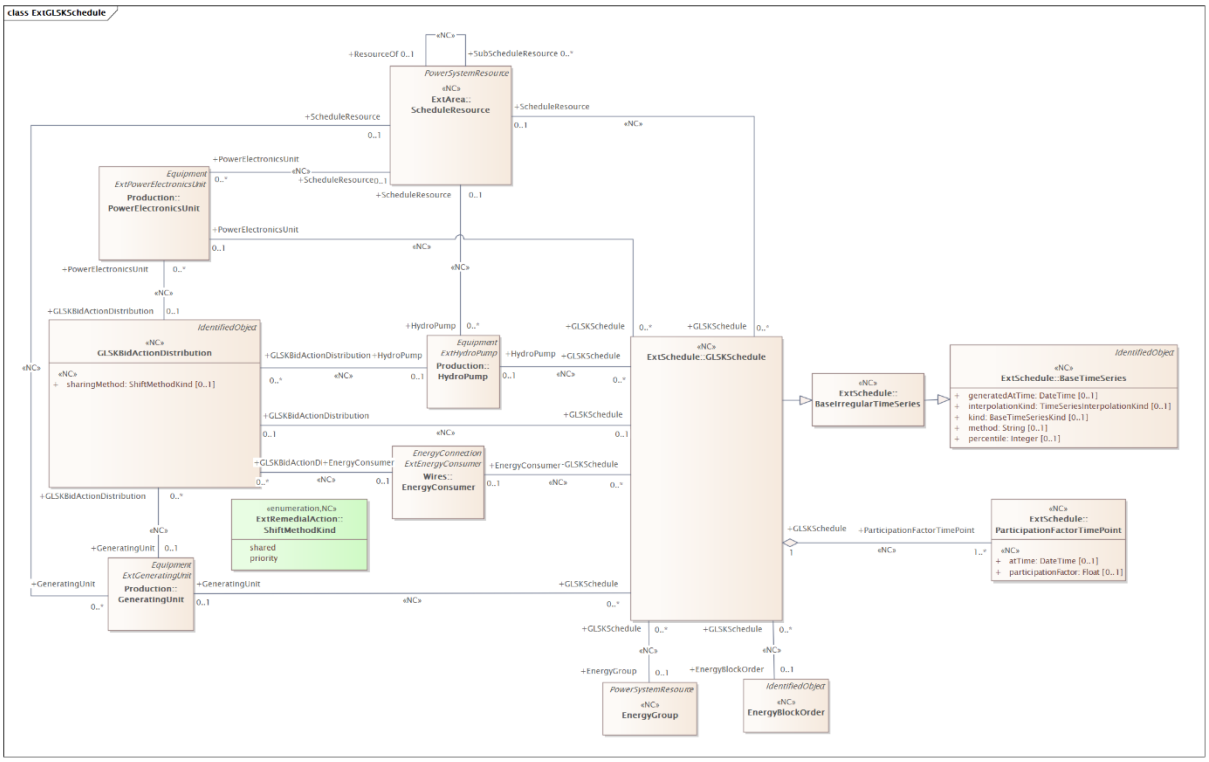

Figure 14 – Class diagram ExtGLSKs::ExtGLSKSchedule

Figure 14: The diagram contains classes related to GLSK schedule.

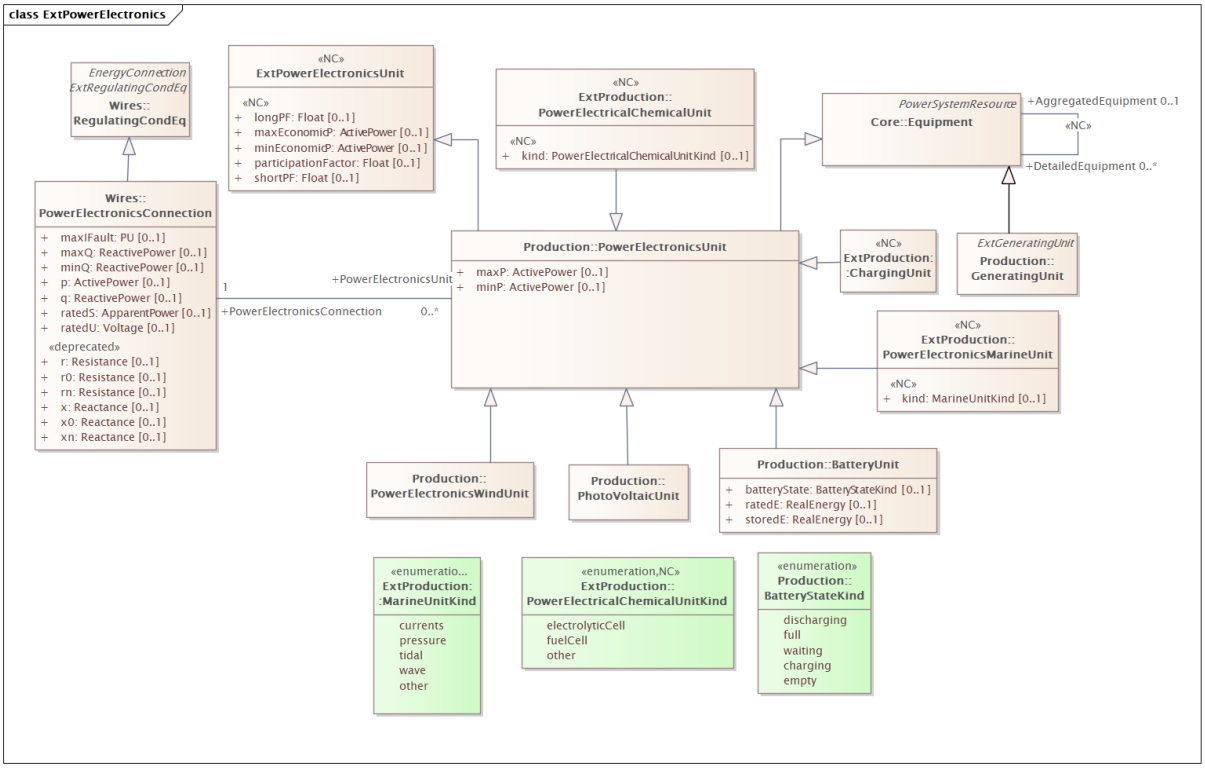

Figure 15 – Class diagram ExtGLSKs::ExtPowerElectronics

Figure 15: The diagram contains classes related to power electronics.

3.10.2 (NC) AreaDispatchableUnit root class

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.
Table 170 shows all attributes of AreaDispatchableUnit.

Table 170 – Attributes of ExtGLSKs::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 enabled to accept a dispatch instruction. If false, the unit has the capability, but it is not enabled to receive a dispatch instruction.

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

Table 171 – Association ends of ExtGLSKs::AreaDispatchableUnit with other classes

mult from	name	mult to	type	description
0..*	SchedulingArea	1..1	SchedulingArea	(NC) The scheduling area that has this area dispatchable unit.

mult from	name	mult to	type	description
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..1	EnergyConsumer	0..1	EnergyConsumer	Energy consumer for this area dispatchable unit.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which has area dispatchable units.
0..1	ScheduleResource	0..1	ScheduleResource	(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	TieCorridor	(NC) Tie Corridor which belongs to the Area Dispatchable Unit.

3.10.3 (NC) EnergyBlockComponent

Inheritance path = EnergyComponent : IdentifiedObject : ExtEuIdentifiedObject
The energy block component is an energy component where the energy group active power is distributed according to the energy block order of each energy component in an energy group.
Table 172 shows all attributes of EnergyBlockComponent.

Table 172 – Attributes of ExtGLSKs::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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 173 shows all association ends of EnergyBlockComponent with other classes.

Table 173 – Association ends of ExtGLSKs::EnergyBlockComponent with other classes

mult from	name	mult to	type	description
1..1	EnergyBlockOrder	1..*	EnergyBlockOrder	(NC) The energy block order for this energy block component.
0..*	HydroPump	0..1	HydroPump	(NC) inherited from: EnergyComponent
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) inherited from: EnergyComponent
0..*	EnergyGroup	0..1	EnergyGroup	(NC) inherited from: EnergyComponent
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) inherited from: EnergyComponent
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) inherited from: EnergyComponent
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.10.4 (NC) EnergyBlockOrder

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
The energy block order is a block (an amount) of active power that forms the sequence of active power orders that are going to be distributed to an energy block component.
Table 174 shows all attributes of EnergyBlockOrder.

Table 174 – Attributes of ExtGLSKs::EnergyBlockOrder

name	mult	type	description
sequence	0..1	Integer	(NC) 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.
longPF	0..1	Float	(NC) Block order long term economic participation factor.
participationFactor	0..1	Float	(NC) Participation factor.
shortPF	0..1	Float	(NC) Block order short term economic 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
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 175 shows all association ends of EnergyBlockOrder with other classes.

Table 175 – Association ends of ExtGLSKs::EnergyBlockOrder with other classes

mult from	name	mult to	type	description
1..*	EnergyBlockComponent	1..1	EnergyBlockComponent	(NC) The energy block component that has this energy block order.
0..1	GLSKSchedule	0..*	GLSKSchedule	(NC) The GLSK schedule for a EnergyBlockOrder.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.10.5 (NC) EnergyComponent

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

The energy component is an active power component for an energy producer or a consumer that has the same energy characteristic, e.g. fuel type and technology.
Table 176 shows all attributes of EnergyComponent.

Table 176 – Attributes of ExtGLSKs::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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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

Table 177 – Association ends of ExtGLSKs::EnergyComponent with other classes

mult from	name	mult to	type	description
0..*	HydroPump	0..1	HydroPump	(NC) The hydro pump that relates to this energy component.
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) The generating unit that is part of this energy component.
0..*	EnergyGroup	0..1	EnergyGroup	(NC) The energy group that has this energy component.
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) The power electronics unit that relates to this energy component.
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) The energy consumer that relates to this energy component.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.10.6 (NC) EnergyGroup

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
An energy group is an aggregation of energy components which have the same energy characteristic, e.g. fuel type and technology. It can be used to allocate energy.
Table 178 shows all attributes of EnergyGroup.

Table 178 – Attributes of ExtGLSKs::EnergyGroup

name	mult	type	description
longPF	0..1	Float	(NC) Energy group long term economic participation factor.
participationFactor	0..1	Float	(NC) Participation factor.
shortPF	0..1	Float	(NC) Energy group short term economic participation factor.
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 179 shows all association ends of EnergyGroup with other classes.

Table 179 – Association ends of ExtGLSKs::EnergyGroup with other classes

mult from	name	mult to	type	description
0..*	SchedulingArea	0..1	SchedulingArea	(NC) The scheduling area that has this energy group.
0..*	EnergyType	0..1	EnergyTypeReference	(NC) The energy type that the energy group are defined by.
0..1	EnergyComponent	0..*	EnergyComponent	(NC) The energy component that is part of this energy group.
0..1	GLSKSchedule	0..*	GLSKSchedule	(NC) The GLSK schedule for an EnergyGroup.
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.10.7 (NC) EnergyTypeReference

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

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 180 shows all attributes of EnergyTypeReference.

Table 180 – Attributes of ExtGLSKs::EnergyTypeReference

name	mult	type	description
energyKind	0..1	EnergyKind	(NC) The kind of energy type.
reference	0..1	IRI	(NC) The reference IRI or URI to the energy type.
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

Table 181 shows all association ends of EnergyTypeReference with other classes.

Table 181 – Association ends of ExtGLSKs::EnergyTypeReference with other classes

mult from	name	mult to	type	description
0..1	GeneratingUnit	0..*	GeneratingUnit	(NC) Generating unit that has an energy reference type.
0..1	PowerElectronicsUnit	0..*	PowerElectronicsUnit	(NC) Power electronics unit that has primary energy source.
0..1	PowerSchedule	0..*	PowerSchedule	(NC) Power schedule which has energy type references.
0..1	EnergyGroup	0..*	EnergyGroup	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.10.8 (NC) ExtEnergyConsumer root class

EU Network Code extension of EnergyConsumer.
Table 182 shows all attributes of ExtEnergyConsumer.

Table 182 – Attributes of ExtGLSKs::ExtEnergyConsumer

name	mult	type	description
longPF	0..1	Float	(NC) Energy consumer long term economic participation factor.
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.
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/sum(PF). In the case of priority strategy, the item with the lowest number gets allocated energy first.
shortPF	0..1	Float	(NC) Energy consumer short term economic participation factor.

2236

2237 ### 3.10.9 (NC) ExtGeneratingUnit root class

2238 EU Network Code extension of GeneratingUnit.
2239 Table 183 shows all attributes of ExtGeneratingUnit.

2240 **Table 183 – Attributes of ExtGLSKs::ExtGeneratingUnit**

name	mult	type	description
shutdownTime	0..1	Duration	(NC) Time it takes to shutdown the unit.
shutdownCost	0..1	Money	(NC) The shutdown cost incurred for each shutdown of the GeneratingUnit.
maxStartupLoad	0..1	ActivePower	(NC) Maximum consumption by the generating unit as part of the startup process.
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.
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/sum(PF). In the case of priority strategy, the item with the lowest number gets allocated energy first.
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.
warmStartupCost	0..1	Money	(NC) The warm startup cost incurred for each start of the GeneratingUnit.

2241

2242 ### 3.10.10 (NC) ExtHydroPump root class

2243 EU Network Code extension of HydroPump.
2244 Table 184 shows all attributes of ExtHydroPump.

2245 **Table 184 – Attributes of ExtGLSKs::ExtHydroPump**

name	mult	type	description
longPF	0..1	Float	(NC) Hydro pump long term economic participation factor.
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.
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

name	mult	type	description
			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/sum(PF). In the case of priority strategy, the item with the lowest number gets allocated energy first.
shortPF	0..1	Float	(NC) Hydro pump short term economic participation factor.

3.10.11 (NC) ExtPowerElectronicsUnit root class

EU Network Code extension of PowerElectronicsUnit.
Table 185 shows all attributes of ExtPowerElectronicsUnit.

Table 185 – Attributes of ExtGLSKs::ExtPowerElectronicsUnit

name	mult	type	description
longPF	0..1	Float	(NC) Power electronics unit long term economic participation factor.
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.
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/sum(PF). In the case of priority strategy, the item with the lowest number gets allocated energy first.
shortPF	0..1	Float	(NC) Power electronics unit short term economic participation factor.

3.10.12 (NC) GLSKBidActionDistribution

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Distribution of the bid action on the generator and load shift keys.
Table 186 shows all attributes of GLSKBidActionDistribution.

Table 186 – Attributes of ExtGLSKs::GLSKBidActionDistribution

name	mult	type	description
sharingMethod	0..1	ShiftMethodKind	(NC) Method for sharing the Generation and Load Shift Key (GLSK).
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

Table 187 shows all association ends of GLSKBidActionDistribution with other classes.

Table 187 – Association ends of ExtGLSKs::GLSKBidActionDistribution with other classes

mult from	name	mult to	type	description
0..*	PowerBidSchedule	0..1	PowerBidSchedule	(NC) Power bid schedule for the given distribution.
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) Generating unit distribution for a given bid.
0..1	PowerElectronicsUnit	0..*	PowerElectronicsUnit	(NC) Power electronics unit distribution for a given bid.
0..*	HydroPump	0..1	HydroPump	(NC) Hydro pump distribution for a given bid.
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) Energy consumers distribution for a given bid.
0..1	GLSKSchedule	0..1	GLSKSchedule	(NC) GLSK schedule in GLSK bid action distribution.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.10.13 (NC) ProportionalEnergyComponent

Inheritance path = EnergyComponent : IdentifiedObject : ExtEuIdentifiedObject
Serves for grouping components within an energy group, with proportional active power allocation to all components.
Table 188 shows all attributes of ProportionalEnergyComponent.

Table 188 – Attributes of ExtGLSKs::ProportionalEnergyComponent

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 189 shows all association ends of ProportionalEnergyComponent with other classes.

2270 **Table 189 – Association ends of ExtGLSKs::ProportionalEnergyComponent with other**
2271 **classes**

mult from	name	mult to	type	description
0..*	HydroPump	0..1	HydroPump	(NC) inherited from: EnergyComponent
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) inherited from: EnergyComponent
0..*	EnergyGroup	0..1	EnergyGroup	(NC) inherited from: EnergyComponent
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) inherited from: EnergyComponent
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) inherited from: EnergyComponent
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

2272

2273 ### 3.10.14 (NC) EnergyKind enumeration

2274 Categories of energy used for energy groups.
2275 Table 190 shows all literals of EnergyKind.

2276 **Table 190 – Literals of ExtGLSKs::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 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.

literal	value	description
other		Other.

3.11 Impact assessment matrix extensions

3.11.1 General

This package contains the extensions related to the impact assessment matrix.

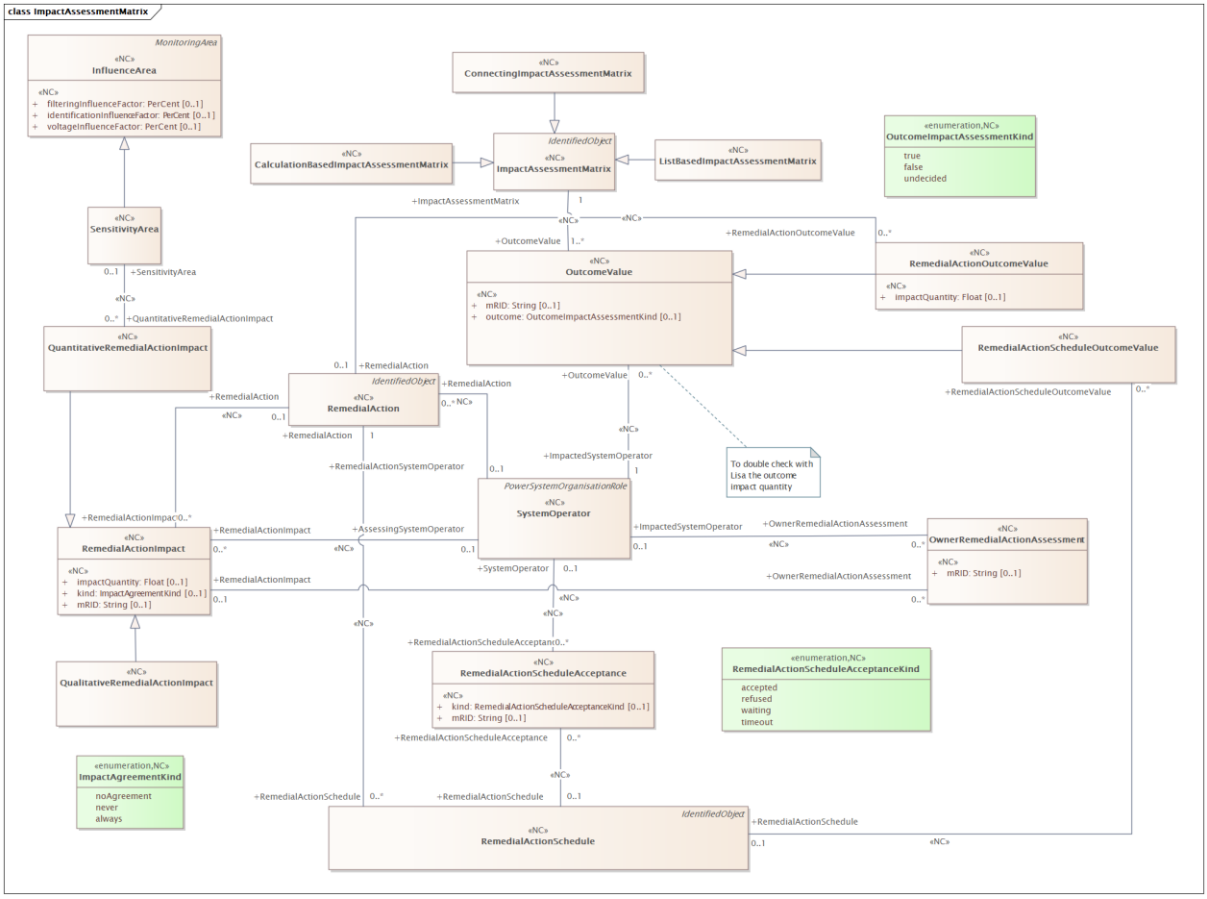

Figure 16 – Class diagram ExtImpactAssessmentMatrix::ImpactAssessmentMatrix

Figure 16: The diagram contains the classes related to the modelling of the impact assessment matrix.

3.11.2 (NC) CalculationBasedImpactAssessmentMatrix

Inheritance path = ImpactAssessmentMatrix : IdentifiedObject : ExtEuIdentifiedObject
Calculation based impact assessment matrix. It relates to the remedial action schedule. Calculation-Based is the impact matrix determined by calculating the impact factors (eventually scaled by the intensity of the remedial action) and matching them against a threshold in a determined way described by the methodologies.
Table 191 shows all attributes of CalculationBasedImpactAssessmentMatrix.

Table 191 – Attributes of ExtImpactAssessmentMatrix::CalculationBasedImpactAssessmentMatrix

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 192 shows all association ends of CalculationBasedImpactAssessmentMatrix with other classes.

Table 192 – Association ends of ExtImpactAssessmentMatrix::CalculationBasedImpactAssessmentMatrix with other classes

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

3.11.3 (NC) ConnectingImpactAssessmentMatrix

Inheritance path = ImpactAssessmentMatrix : IdentifiedObject : ExtEuIdentifiedObject
Connecting system operator matrix is the impact matrix indicating which system operators are connecting for that specific remedial action. The concept of connecting system operator for a remedial action is defined by CSAm Article 2.1(14).
Table 193 shows all attributes of ConnectingImpactAssessmentMatrix.

Table 193 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 194 shows all association ends of ConnectingImpactAssessmentMatrix with other classes.

Table 194 – Association ends of ExtImpactAssessmentMatrix::ConnectingImpactAssessmentMatrix with other classes

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

3.11.4 (NC) ImpactAssessmentMatrix

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
The result of an impact assessment analysis for each remedial action or remedial action schedule onto the grid and operation of each system operator.
Table 195 shows all attributes of ImpactAssessmentMatrix.

Table 195 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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

Table 196 – Association ends of ExtImpactAssessmentMatrix::ImpactAssessmentMatrix with other classes

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

3.11.5 (NC) ListBasedImpactAssessmentMatrix

Inheritance path = ImpactAssessmentMatrix : IdentifiedObject : ExtEuIdentifiedObject
List-Based is the impact matrix determined by agreement of the system operators involved. System operators jointly decide which Remedial Action (eventually scaled by the intensity of the remedial action) is impacting.
Table 197 shows all attributes of ListBasedImpactAssessmentMatrix.

Table 197 – Attributes of 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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

Table 198 – Association ends of ExtImpactAssessmentMatrix::ListBasedImpactAssessmentMatrix with other classes

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

3.11.6 (NC) OutcomeValue root class

Outcome of an impact assessment matrix.
Table 199 shows all attributes of OutcomeValue.

Table 199 – Attributes of ExtImpactAssessmentMatrix::OutcomeValue

name	mult	type	description
outcome	0..1	OutcomeImpactAssessmentKind	(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.

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

Table 200 – Association ends of ExtImpactAssessmentMatrix::OutcomeValue with other classes

mult from	name	mult to	type	description
1..*	ImpactAssessmentMatrix	1..1	ImpactAssessmentMatrix	(NC) the impact assessment matrix which has this value.
0..*	ImpactedSystemOperator	1..1	SystemOperator	(NC) The impacted system operator that has an outcome value.

3.11.7 (NC) OwnerRemedialActionAssessment root class

Owner remedial action assessment of the impact of their remedial action on neighboring system operators.

Table 201 shows all attributes of OwnerRemedialActionAssessment.

Table 201 – 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.

Table 202 shows all association ends of OwnerRemedialActionAssessment with other classes.

Table 202 – Association ends of ExtImpactAssessmentMatrix::OwnerRemedialActionAssessment with other classes

mult from	name	mult to	type	description
0..*	RemedialActionImpact	0..1	RemedialActionImpact	(NC) Remedial action impact which is evaluated by the owner of the remedial action.
0..*	ImpactedSystemOperator	0..1	SystemOperator	(NC) System operator that is evaluated to be impacted by the remedial action done by the remedial action owner.

3.11.8 (NC) RemedialActionOutcomeValue

Inheritance path = OutcomeValue

Outcome of an impact assessment matrix for a remedial action.

Table 203 shows all attributes of RemedialActionOutcomeValue.

Table 203 – 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

name	mult	type	description
			point on HVDC systems or change of taps on phase-shifting transformers.
outcome	0..1	OutcomeImpactAssessmentKind	(NC) inherited from: OutcomeValue
mRID	0..1	String	(NC) inherited from: OutcomeValue

Table 204 shows all association ends of RemedialActionOutcomeValue with other classes.

Table 204 – Association ends of ExtImpactAssessmentMatrix::RemedialActionOutcomeValue with other classes

mult from	name	mult to	type	description
0..*	RemedialAction	0..1	RemedialAction	(NC) The remedial action that has a remedial action outcome value.
1..*	ImpactAssessmentMatrix	1..1	ImpactAssessmentMatrix	(NC) inherited from: OutcomeValue
0..*	ImpactedSystemOperator	1..1	SystemOperator	(NC) inherited from: OutcomeValue

3.11.9 (NC) RemedialActionScheduleOutcomeValue

Inheritance path = OutcomeValue
Outcome of an impact assessment matrix for a remedial action schedule.
Table 205 shows all attributes of RemedialActionScheduleOutcomeValue.

Table 205 – Attributes of ExtImpactAssessmentMatrix::RemedialActionScheduleOutcomeValue

name	mult	type	description
outcome	0..1	OutcomeImpactAssessmentKind	(NC) inherited from: OutcomeValue
mRID	0..1	String	(NC) inherited from: OutcomeValue

Table 206 shows all association ends of RemedialActionScheduleOutcomeValue with other classes.

Table 206 – Association ends of ExtImpactAssessmentMatrix::RemedialActionScheduleOutcomeValue with other classes

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) The remedial action schedule that has a remedial action schedule outcome value.
1..*	ImpactAssessmentMatrix	1..1	ImpactAssessmentMatrix	(NC) inherited from: OutcomeValue
0..*	ImpactedSystemOperator	1..1	SystemOperator	(NC) inherited from: OutcomeValue

3.11.10 (NC) OutcomeImpactAssessmentKind enumeration

Outcome impact assessments kinds.
Table 207 shows all literals of OutcomeImpactAssessmentKind.

Table 207 – Literals of ExtImpactAssessmentMatrix::OutcomeImpactAssessmentKind

literal	value	description
true		True.
false		False.
undecided		Undecided. Used only for list-based impact assessment matrix.

3.12 Package ExtObjectRegistry

3.12.1 General

This package contains the extensions related to the object registry.

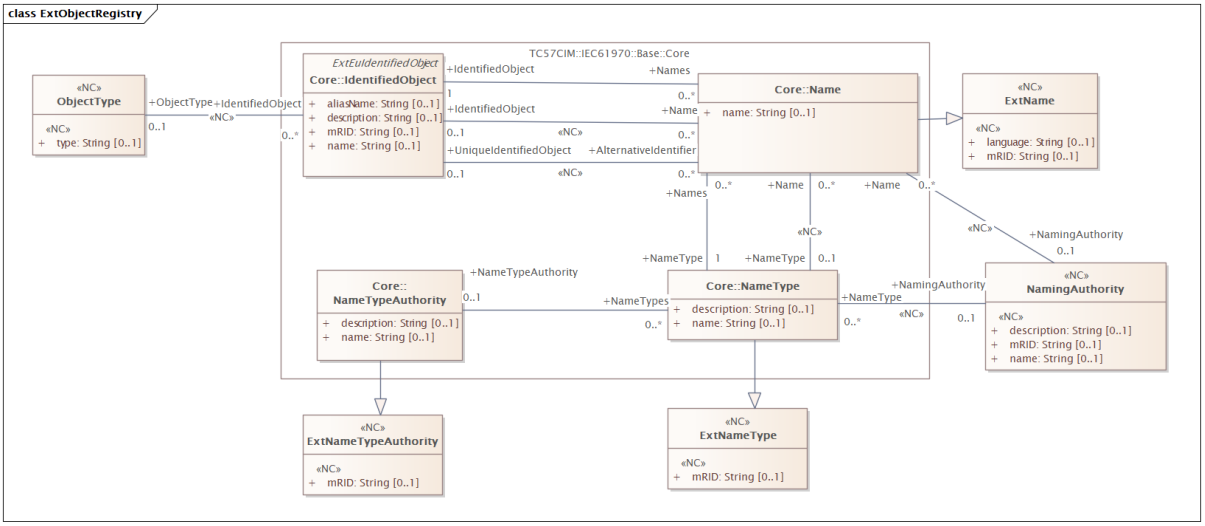

Figure 17 – Class diagram ExtObjectRegistry::ExtObjectRegistry

Figure 17: The diagram contains classes related to the object registry extension.

3.12.2 (NC) ExtName root class

Extension of Name.

Table 208 shows all attributes of ExtName.

Table 208 – 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

name	mult	type	description
			or rdf:about attributes that identify CIM object elements.

3.12.3 (NC) ExtNameType root class

An extension of NameType.
Table 209 shows all attributes of ExtNameType.

Table 209 – 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 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.

3.12.4 (NC) ExtNameTypeAuthority root class

Extension of NameTypeAuthority.
Table 210 shows all attributes of ExtNameTypeAuthority.

Table 210 – 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.

3.12.5 (NC) NamingAuthority root class

Authority responsible for creation and management of names of a given name type and/or name; typically an organization or an enterprise system.
Table 211 shows all attributes of NamingAuthority.

Table 211 – 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

name	mult	type	description
			or rdf:about attributes that identify CIM object elements.
name	0..1	String	(NC) Name of the name authority.

Table 212 shows all association ends of NamingAuthority with other classes.

Table 212 – Association ends of ExtObjectRegistry::NamingAuthority with other classes

mult from	name	mult to	type	description
0..1	NameType	0..*	NameType	(NC) All name types managed by this authority.
0..1	Name	0..*	Name	(NC) All names managed by this authority.

3.12.6 (NC) ObjectType root class

Identifies the specialised type of an object when the instance object is serialised using a generalised class. It may be useful when the object type is not otherwise included in the exchange. For example, a Meter may be serialised as an EndDevice in message exchanges and need to have the ObjectType.type be specified as 'Meter' to provide context to the message receiver.

Table 213 shows all attributes of ObjectType.

Table 213 – 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'.

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

Table 214 – 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.

3.13 Package ExtPowerTransferCorridor

3.13.1 General

This package contains the extensions related to the power transfer corridor.

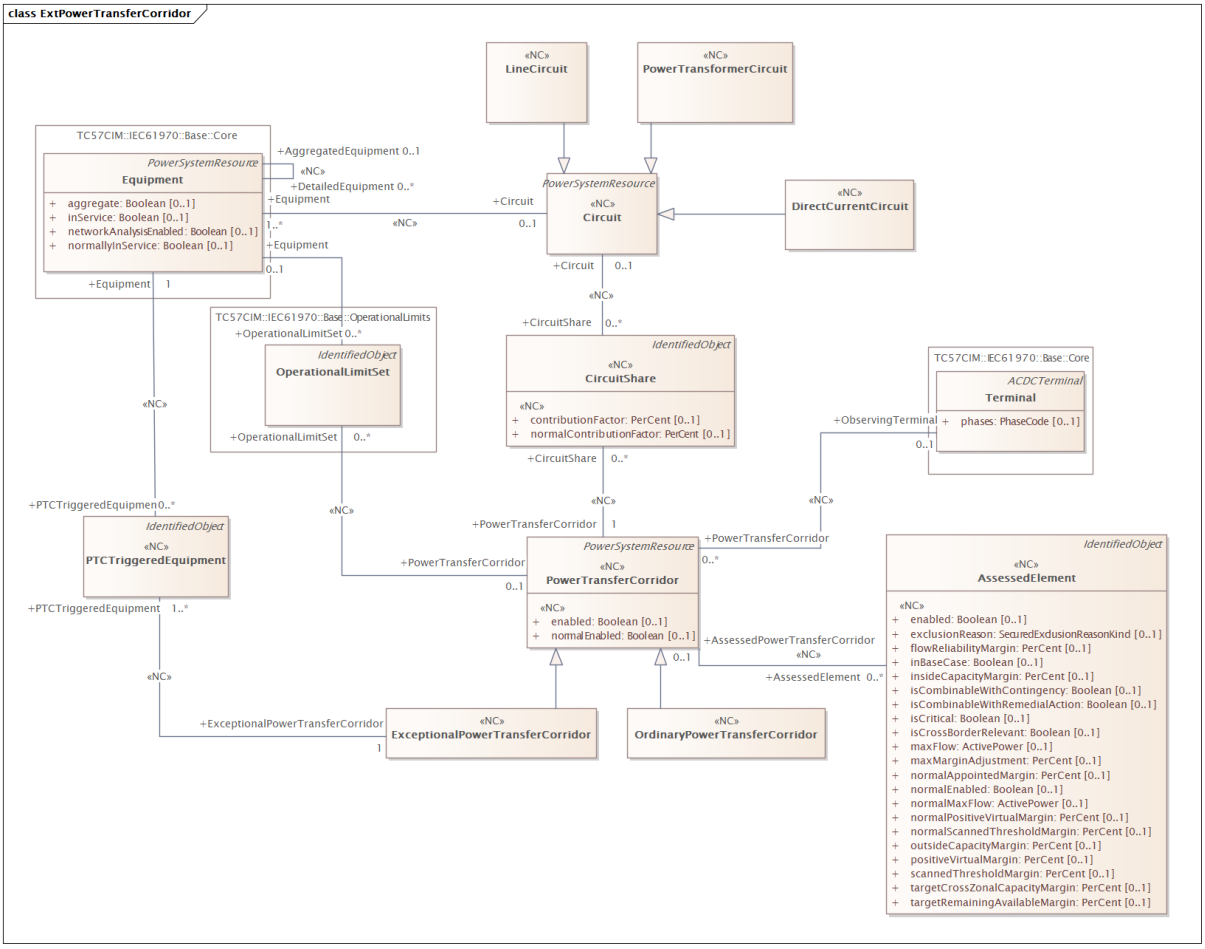

Figure 18 – Class diagram ExtPowerTransferCorridor::ExtPowerTransferCorridor

Figure 18: The diagram contains classes related to power transfer corridor.

3.13.2 (NC) Circuit

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A circuit is a collection of equipment in a network graph that provide common stability limits. The relevant equipment is in general given by the identifying terminal. A software application that can do topology processing shall calculate the equipment belonging to the circuit, if there are no stability limits associated to it. In case of stability limits, the containment reflects the equipments that were used in the calculation/analysis.
Table 215 shows all attributes of Circuit.

Table 215 – Attributes of ExtPowerTransferCorridor::Circuit

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

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

Table 216 – Association ends of ExtPowerTransferCorridor::Circuit with other classes

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

3.13.3 (NC) CircuitShare

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

Defines the share of the circuit which is part of an associated power transfer corridor.

Table 217 shows all attributes of CircuitShare.

Table 217 – 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
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

Table 218 shows all association ends of CircuitShare with other classes.

Table 218 – Association ends of ExtPowerTransferCorridor::CircuitShare with other classes

mult from	name	mult to	type	description
0..*	Circuit	0..1	Circuit	(NC) The circuit that has a share of the power system corridor.
0..*	PowerTransferCorridor	1..1	PowerTransferCorridor	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.13.4 (NC) ExceptionalPowerTransferCorridor

Inheritance path = PowerTransferCorridor : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Potential power transfer corridor that can be triggered by equipment which changes its in service status or it is operating in an island.

Table 219 shows all attributes of ExceptionalPowerTransferCorridor.

Table 219 – Attributes of ExtPowerTransferCorridor::ExceptionalPowerTransferCorridor

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: PowerTransferCorridor
normalEnabled	0..1	Boolean	(NC) inherited from: PowerTransferCorridor
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

Table 220 shows all association ends of ExceptionalPowerTransferCorridor with other classes.

Table 220 – Association ends of ExtPowerTransferCorridor::ExceptionalPowerTransferCorridor with other classes

mult from	name	mult to	type	description
1..1	PTCTriggeredEquipment	1..*	PTCTriggeredEquipment	(NC) The equipment that triggers this exceptional power transfer corridor.
0..1	OperationalLimitSet	0..*	OperationalLimitSet	(NC) inherited from: PowerTransferCorridor
0..*	ObservingTerminal	0..1	Terminal	(NC) inherited from: PowerTransferCorridor
0..1	AssessedElement	0..*	AssessedElement	(NC) inherited from: PowerTransferCorridor
1..1	CircuitShare	0..*	CircuitShare	(NC) inherited from: PowerTransferCorridor

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

3.13.5 (NC) LineCircuit

Inheritance path = Circuit : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A line circuit is a circuit that has at least one ACLineSegment and may or may not include related switching and/or auxiliary equipment.
Table 221 shows all attributes of LineCircuit.

Table 221 – Attributes of ExtPowerTransferCorridor::LineCircuit

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 222 shows all association ends of LineCircuit with other classes.

Table 222 – Association ends of ExtPowerTransferCorridor::LineCircuit with other classes

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

3.13.6 (NC) OrdinaryPowerTransferCorridor

Inheritance path = PowerTransferCorridor : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Power transfer corridor defined for normal operating network.

Table 223 shows all attributes of OrdinaryPowerTransferCorridor.

Table 223 – Attributes of ExtPowerTransferCorridor::OrdinaryPowerTransferCorridor

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: PowerTransferCorridor
normalEnabled	0..1	Boolean	(NC) inherited from: PowerTransferCorridor
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

Table 224 shows all association ends of OrdinaryPowerTransferCorridor with other classes.

Table 224 – Association ends of ExtPowerTransferCorridor::OrdinaryPowerTransferCorridor with other classes

mult from	name	mult to	type	description
0..1	OperationalLimitSet	0..*	OperationalLimitSet	(NC) inherited from: PowerTransferCorridor
0..*	ObservingTerminal	0..1	Terminal	(NC) inherited from: PowerTransferCorridor
0..1	AssessedElement	0..*	AssessedElement	(NC) inherited from: PowerTransferCorridor
1..1	CircuitShare	0..*	CircuitShare	(NC) inherited from: PowerTransferCorridor
1..1	PTCActivePowerSupport	0..*	PTCActivePowerSupport	(NC) inherited from: PowerTransferCorridor
1..1	PinPowerTransferCorridor	0..*	PinPowerTransferCorridor	(NC) inherited from: PowerTransferCorridor
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.13.7 (NC) PowerTransferCorridor

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A power transfer corridor is defined as a set of circuits (transmission lines or transformers) separating two portions of the power system, or a subset of circuits exposed to a substantial portion of the transmission exchange between two parts of the system.
Table 225 shows all attributes of PowerTransferCorridor.

Table 225 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 226 shows all association ends of PowerTransferCorridor with other classes.

Table 226 – 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..*	ObservingTerminal	0..1	Terminal	(NC) The terminal that identifies the power transfer corridor.
0..1	AssessedElement	0..*	AssessedElement	(NC) The assessed element indicating that the power transfer corridor is assessed, i.e. monitored.
1..1	CircuitShare	0..*	CircuitShare	(NC) The circuit share for this power transfer corridor.

mult from	name	mult to	type	description
1..1	PTCActivePowerSupport	0..*	PTCActivePowerSupport	(NC) The active power capability associated with this PowerTransferCorridor.
1..1	PinPowerTransferCorridor	0..*	PinPowerTransferCorridor	(NC) The pin that uses this input.
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.13.8 (NC) PowerTransformerCircuit

Inheritance path = Circuit : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A power transformer circuit is a circuit that has at least one PowerTransformer and may or may not include related switching and/or auxiliary equipment.
Table 227 shows all attributes of PowerTransformerCircuit.

Table 227 – Attributes of ExtPowerTransferCorridor::PowerTransformerCircuit

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 228 shows all association ends of PowerTransformerCircuit with other classes.

Table 228 – Association ends of ExtPowerTransferCorridor::PowerTransformerCircuit with other classes

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

3.13.9 (NC) PTCTriggeredEquipment

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Power Transfer Corridor triggered equipment connects the equipment that will create the exceptional power transfer corridor when taking out of service. e.g. A system with three lines gets an exceptional power transfer corridor when one of the lines is taken out of service.
Table 229 shows all attributes of PTCTriggeredEquipment.

Table 229 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 230 shows all association ends of PTCTriggeredEquipment with other classes.

Table 230 – Association ends of ExtPowerTransferCorridor::PTCTriggeredEquipment 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	ExceptionalPowerTransferCorridor	(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
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.13.10 (NC) DirectCurrentCircuit

Inheritance path = Circuit : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
A direct current circuit is a circuit consists of direct current equipment.
Table 231 shows all attributes of DirectCurrentCircuit.

Table 231 – Attributes of ExtPowerTransferCorridor::DirectCurrentCircuit

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 232 shows all association ends of DirectCurrentCircuit with other classes.

Table 232 – Association ends of ExtPowerTransferCorridor::DirectCurrentCircuit with other classes

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

3.14 Package ExtProduction

3.14.1 General

This package contains the extensions related to the production.

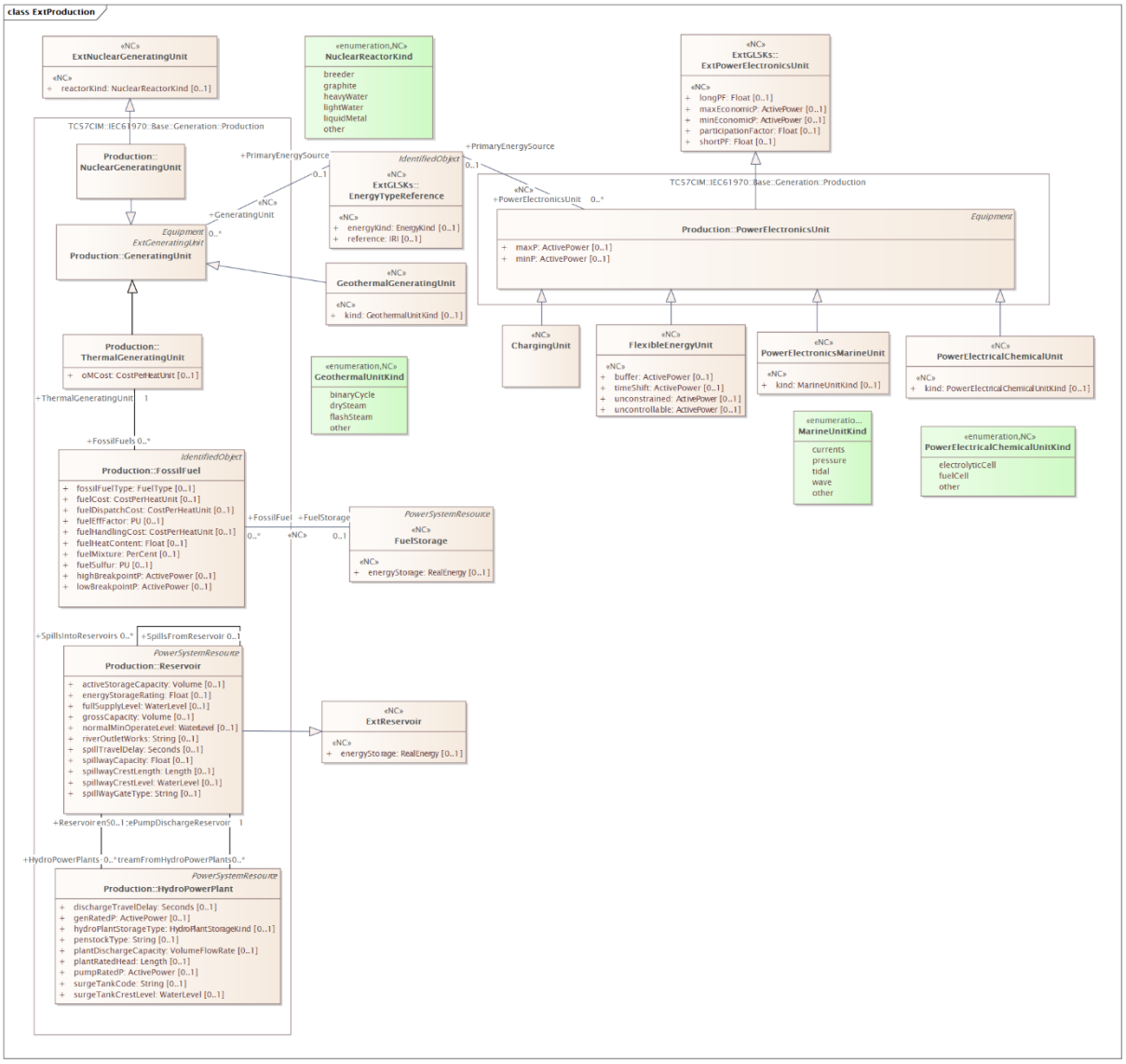

Figure 19 – Class diagram ExtProduction::ExtProduction

Figure 19: The diagram contains classes related to production.

3.14.2 (NC) FuelStorage

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject
Fuel storage. e.g. pile of coal that can be shared between multiple thermal generating units.
Table 233 shows all attributes of FuelStorage.

Table 233 – 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
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

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

Table 234 shows all association ends of FuelStorage with other classes.

Table 234 – 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.14.3 (NC) ChargingUnit

Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtPowerElectronicsUnit

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.

Table 235 shows all attributes of ChargingUnit.

Table 235 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
longPF	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
maxEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
minEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit

name	mult	type	description
participationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
shortPF	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit

Table 236 shows all association ends of ChargingUnit with other classes.

Table 236 – 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.14.4 (NC) ExtNuclearGeneratingUnit root class

European Network Code extension of NuclearGeneratingUnit.
Table 237 shows all attributes of ExtNuclearGeneratingUnit.

Table 237 – Attributes of ExtProduction::ExtNuclearGeneratingUnit

name	mult	type	description
reactorKind	0..1	NuclearReactorKind	(NC) Kind of nuclear reactor.

3.14.5 (NC) ExtReservoir root class

EU Network Code extension of Reservoir.
Table 238 shows all attributes of ExtReservoir.

2572 **Table 238 – Attributes of ExtProduction::ExtReservoir**

name	mult	type	description
energyStorage	0..1	RealEnergy	(NC) Amount of energy available in the storage.

2573

2574 ### 3.14.6 (NC) FlexibleEnergyUnit

2575 Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource :
2576 IdentifiedObject : ExtEuIdentifiedObject : ExtPowerElectronicsUnit
2577 Flexible consumer or embedded producer of energy. The unit cannot be a net producer.
2578 Table 239 shows all attributes of FlexibleEnergyUnit.

2579 **Table 239 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
longPF	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
maxEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit

name	mult	type	description
minEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
participationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
shortPF	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit

Table 240 shows all association ends of FlexibleEnergyUnit with other classes.

Table 240 – 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.14.7 (NC) GeothermalGeneratingUnit

Inheritance path = GeneratingUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtGeneratingUnit

Generating unit that is generating electrical power from geothermal energy.

Table 241 shows all attributes of GeothermalGeneratingUnit.

Table 241 – Attributes of ExtProduction::GeothermalGeneratingUnit

name	mult	type	description
kind	0..1	GeothermalUnitKind	(NC) Kind of geothermal generating unit.
allocSpinResP	0..1	ActivePower	inherited from: GeneratingUnit
autoCntrlMarginP	0..1	ActivePower	inherited from: GeneratingUnit
baseP	0..1	ActivePower	inherited from: GeneratingUnit
controlDeadband	0..1	ActivePower	inherited from: GeneratingUnit

name	mult	type	description
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
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
shutdownTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
shutdownCost	0..1	Money	(NC) inherited from: ExtGeneratingUnit
maxStartupLoad	0..1	ActivePower	(NC) inherited from: ExtGeneratingUnit
warmStartupTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
coolDownTime	0..1	Duration	(NC) inherited from: ExtGeneratingUnit
participationFactor	0..1	Float	(NC) inherited from: ExtGeneratingUnit
startupRampRate	0..1	ActivePowerChangeRate	(NC) inherited from: ExtGeneratingUnit
warmStartupCost	0..1	Money	(NC) inherited from: ExtGeneratingUnit

Table 242 shows all association ends of GeothermalGeneratingUnit with other classes.

Table 242 – 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
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.14.8 (NC) PowerElectricalChemicalUnit

Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtPowerElectronicsUnit

A unit capable of either generating electrical energy from chemical reactions or using electrical energy to cause chemical reactions.

Table 243 shows all attributes of PowerElectricalChemicalUnit.

Table 243 – Attributes of ExtProduction::PowerElectricalChemicalUnit

name	mult	type	description
kind	0..1	PowerElectricalChemicalUnitKind	(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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
longPF	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
maxEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
minEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
participationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
shortPF	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit

Table 244 shows all association ends of PowerElectricalChemicalUnit with other classes.

Table 244 – 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

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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.14.9 (NC) PowerElectronicsMarineUnit

Inheritance path = PowerElectronicsUnit : Equipment : PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject : ExtPowerElectronicsUnit

A unit that capture energy from marine sources, e.g. waves, for generating electrical power.

Table 245 shows all attributes of PowerElectronicsMarineUnit.

Table 245 – Attributes of ExtProduction::PowerElectronicsMarineUnit

name	mult	type	description
kind	0..1	MarineUnitKind	(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	0..1	String	inherited from: IdentifiedObject
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
longPF	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
maxEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
minEconomicP	0..1	ActivePower	(NC) inherited from: ExtPowerElectronicsUnit
participationFactor	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit
shortPF	0..1	Float	(NC) inherited from: ExtPowerElectronicsUnit

Table 246 shows all association ends of PowerElectronicsMarineUnit with other classes.

Table 246 – 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.14.10 (NC) GeothermalUnitKind enumeration

Kind of geothermal.
Table 247 shows all literals of GeothermalUnitKind.

Table 247 – 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.

3.14.11 (NC) MarineUnitKind enumeration

Kind of marine energy capture.
Table 248 shows all literals of MarineUnitKind.

Table 248 – 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.

3.14.12 (NC) NuclearReactorKind enumeration

Kind of nuclear reactor.
Table 249 shows all literals of NuclearReactorKind.

Table 249 – 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.
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.

3.14.13 (NC) PowerElectricalChemicalUnitKind enumeration

Kind of power electrical chemical unit.
Table 250 shows all literals of PowerElectricalChemicalUnitKind.

Table 250 – 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.

literal	value	description
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.

3.15 Remedial action extensions

3.15.1 General

This package contains the extensions related to the remedial action.

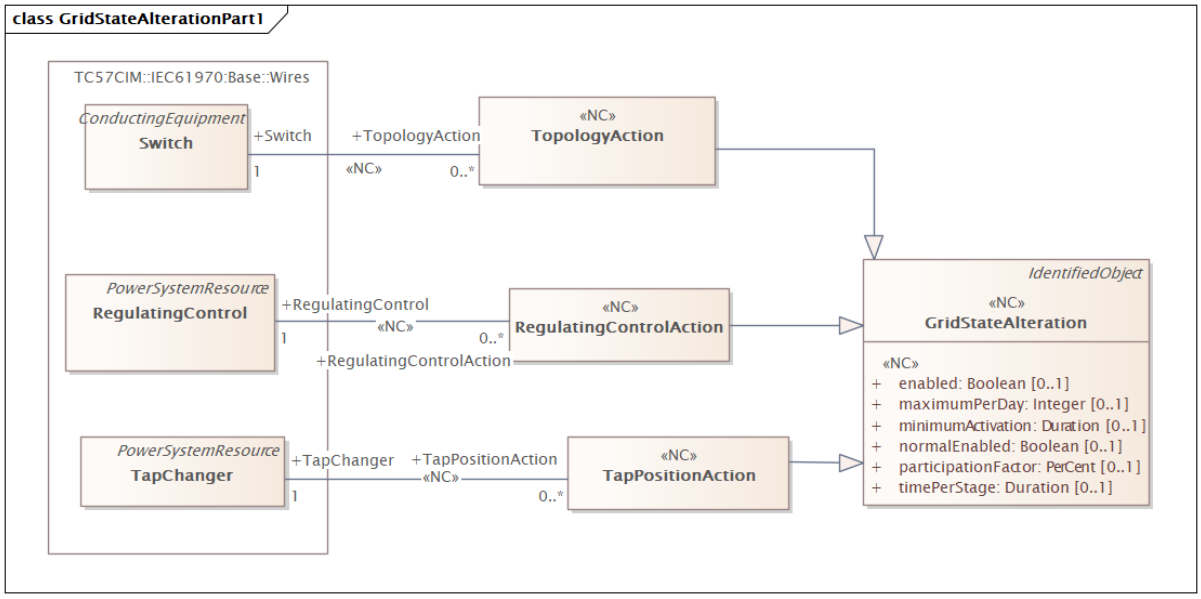

Figure 20 – Class diagram ExtRemedialAction::GridStateAlterationPart1

Figure 20: This diagram contains extended classes for the purpose of the remedial action data exchange.

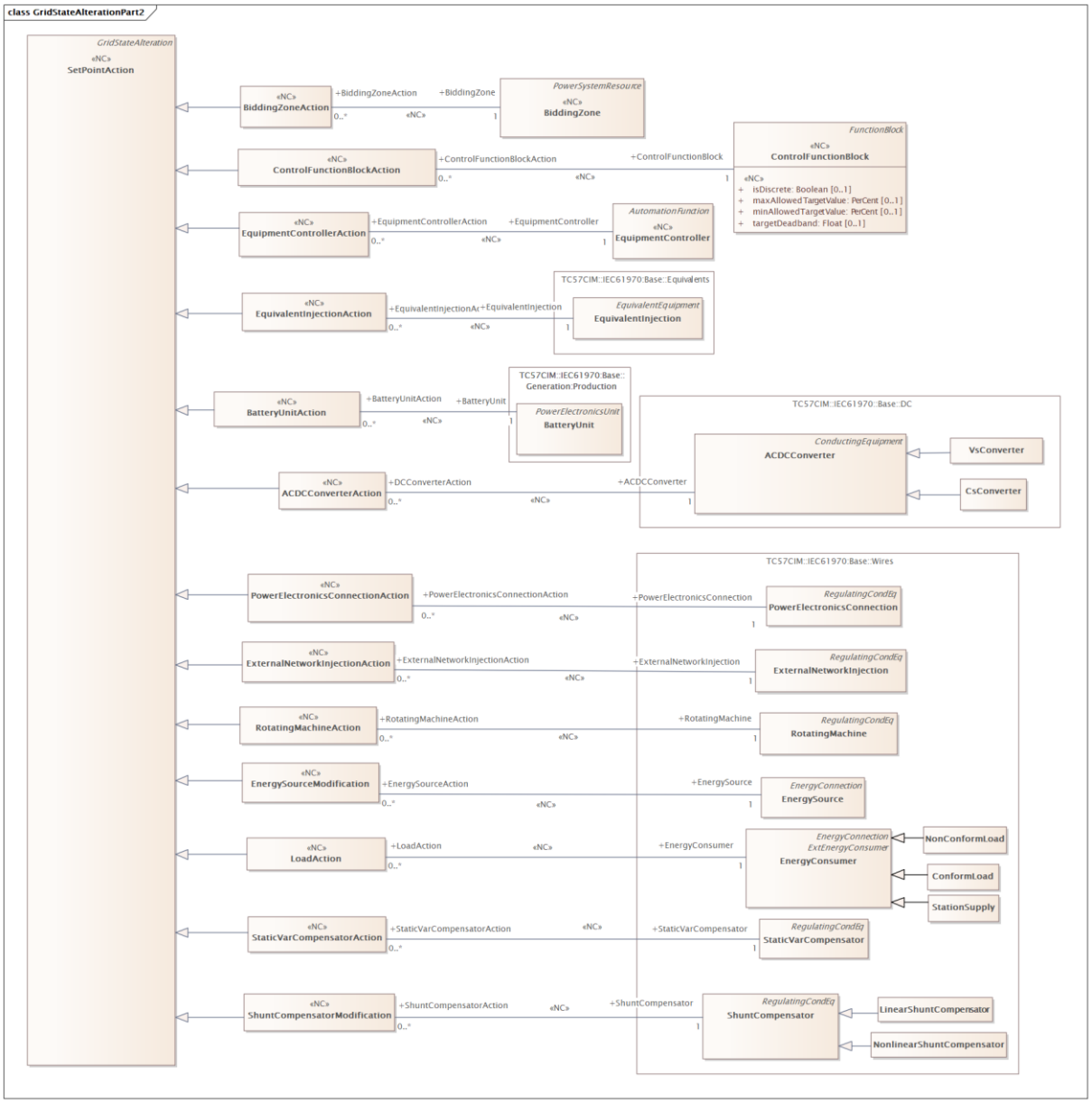

Figure 21 – Class diagram ExtRemedialAction::GridStateAlterationPart2

Figure 21: This diagram contains extended classes for the purpose of the remedial action data exchange.

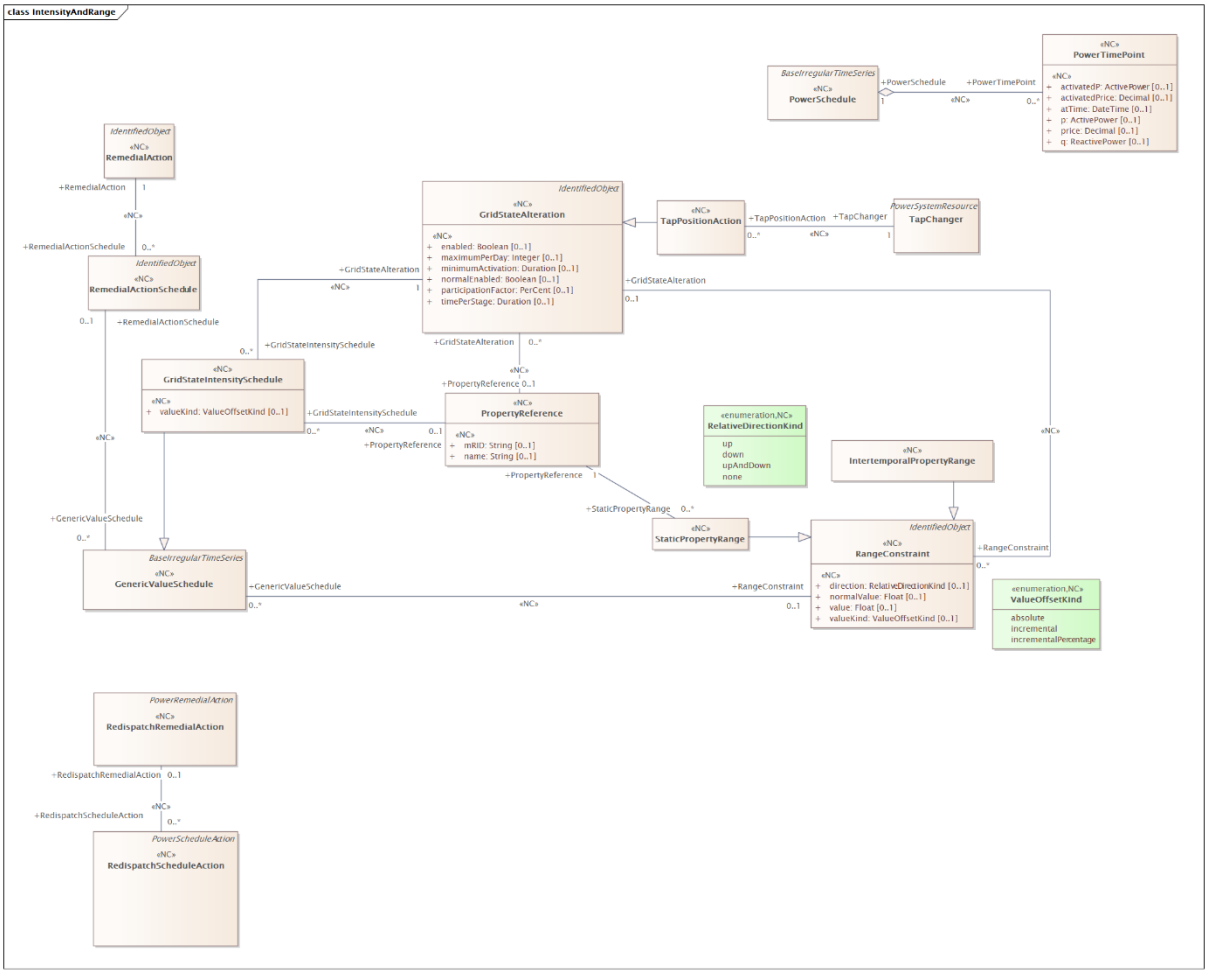

Figure 22 – Class diagram ExtRemedialAction::IntensityAndRange

Figure 22: This diagram contains extended classes related to the modelling of static, dynamic ranges and intensity.

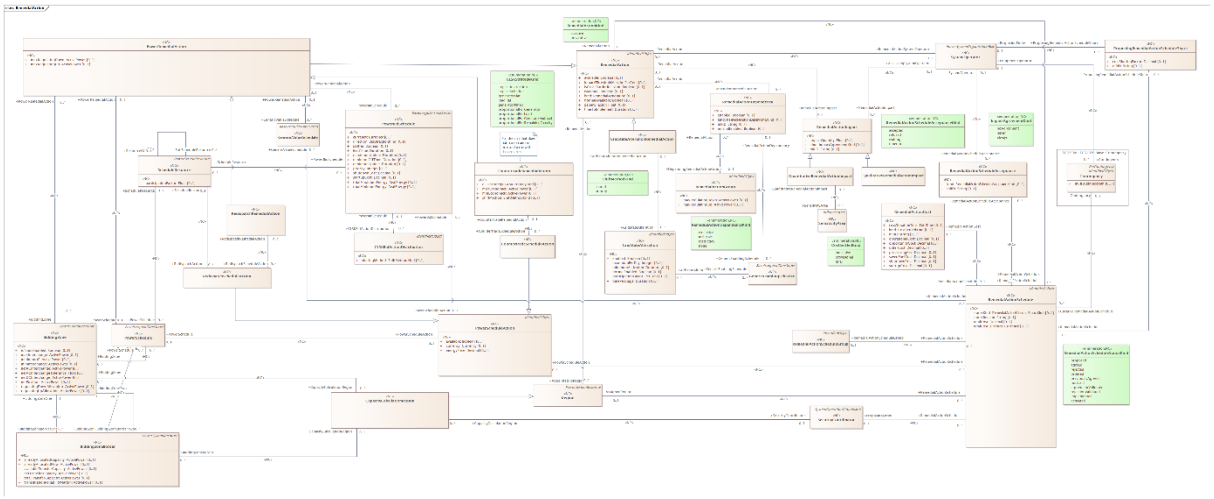

Figure 23 – Class diagram ExtRemedialAction::RemedialAction

Figure 23: The diagram contains main classes related to the remedial action.

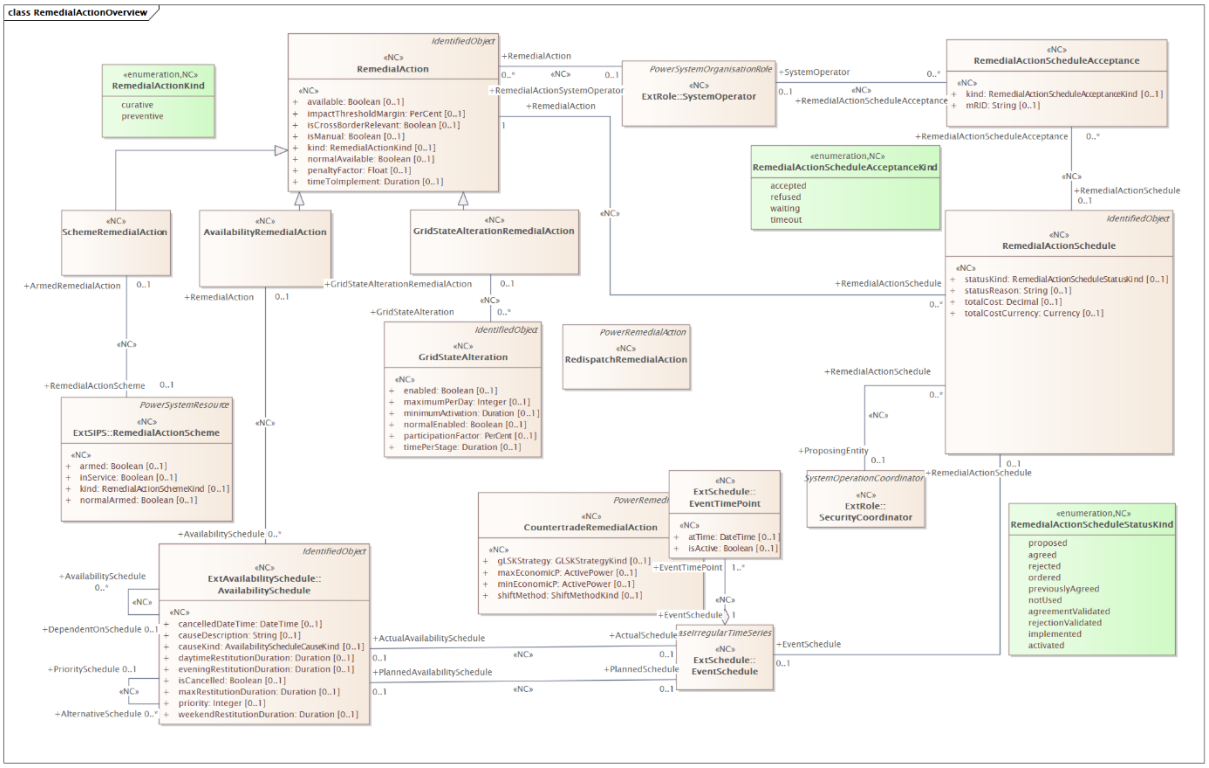

Figure 24 – Class diagram ExtRemedialAction::RemedialActionOverview

Figure 24: The diagram is an overview of the remedial action related extensions.

3.15.2 (NC) ACDCConverterAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Alternate current Direct current (ACDC) converter action.

Table 251 shows all attributes of ACDCConverterAction.

Table 251 – Attributes of ExtRemedialAction::ACDCConverterAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 252 shows all association ends of ACDCConverterAction with other classes.

2667 **Table 252 – Association ends of ExtRemedialAction::ACDCConverterAction with other**
2668 **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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

2669

2670 ### 3.15.3 (NC) AvailabilityRemedialAction

2671 Inheritance path = RemedialAction : IdentifiedObject : ExtEuIdentifiedObject
2672 Availability remedial action is a remedial action that cancels or reschedules an availability
2673 schedule.
2674 Table 253 shows all attributes of AvailabilityRemedialAction.

2675 **Table 253 – Attributes of ExtRemedialAction::AvailabilityRemedialAction**

name	mult	type	description
available	0..1	Boolean	(NC) inherited from: RemedialAction
kind	0..1	RemedialActionKind	(NC) inherited from: RemedialAction
penaltyFactor	0..1	Float	(NC) inherited from: RemedialAction
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: RemedialAction
isManual	0..1	Boolean	(NC) inherited from: RemedialAction
timeToImplement	0..1	Duration	(NC) inherited from: RemedialAction
normalAvailable	0..1	Boolean	(NC) inherited from: RemedialAction
impactThresholdMargin	0..1	PerCent	(NC) inherited from: RemedialAction
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

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

Table 254 shows all association ends of AvailabilityRemedialAction with other classes.

Table 254 – Association ends of ExtRemedialAction::AvailabilityRemedialAction with other classes

mult from	name	mult to	type	description
0..1	AvailabilitySchedule	0..*	AvailabilitySchedule	(NC) Availability schedule that is part of the remedial action.
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) inherited from: RemedialAction
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: RemedialAction
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) inherited from: RemedialAction
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) inherited from: RemedialAction
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToRegion	0..1	Region	(NC) inherited from: RemedialAction
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) inherited from: RemedialAction
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) inherited from: RemedialAction
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: RemedialAction
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialAction
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: RemedialAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.4 (NC) BatteryUnitAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Battery unit setpoint action.

Table 255 shows all attributes of BatteryUnitAction.

Table 255 – Attributes of ExtRemedialAction::BatteryUnitAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration

name	mult	type	description
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 256 shows all association ends of BatteryUnitAction with other classes.

Table 256 – 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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.5 (NC) BiddingZoneAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Bidding zone set point action.

Table 257 shows all attributes of BiddingZoneAction.

Table 257 – Attributes of ExtRemedialAction::BiddingZoneAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration

name	mult	type	description
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 258 shows all association ends of BiddingZoneAction with other classes.

Table 258 – Association ends of ExtRemedialAction::BiddingZoneAction with other classes

mult from	name	mult to	type	description
0..*	BiddingZone	1..1	BiddingZone	(NC) The bidding zone that has this bidding zone action.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.6 (NC) CountertradeRemedialAction

Inheritance path = PowerRemedialAction : RemedialAction : IdentifiedObject : ExtEuIdentifiedObject

Countertrade is a remedial action to relieve physical congestions where the location of activated resources within the bidding zone is not known.

Table 259 shows all attributes of CountertradeRemedialAction.

2709 **Table 259 – Attributes of ExtRemedialAction::CountertradeRemedialAction**

name	mult	type	description
gLSKStrategy	0..1	GLSKStrategyKind	(NC) Generating and load shift keys strategy gives instruction on how the value (Active power) is going to be distributed inside the relevant bidding zone.
shiftMethod	0..1	ShiftMethodKind	(NC) Shift method used for the countertrade action.
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.
maxRegulatingDown	0..1	ActivePower	(NC) inherited from: PowerRemedialAction
maxRegulatingUp	0..1	ActivePower	(NC) inherited from: PowerRemedialAction
available	0..1	Boolean	(NC) inherited from: RemedialAction
kind	0..1	RemedialActionKind	(NC) inherited from: RemedialAction
penaltyFactor	0..1	Float	(NC) inherited from: RemedialAction
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: RemedialAction
isManual	0..1	Boolean	(NC) inherited from: RemedialAction
timeToImplement	0..1	Duration	(NC) inherited from: RemedialAction
normalAvailable	0..1	Boolean	(NC) inherited from: RemedialAction
impactThresholdMargin	0..1	PerCent	(NC) inherited from: RemedialAction
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

2710
2711 Table 260 shows all association ends of CountertradeRemedialAction with other classes.

2712 **Table 260 – Association ends of ExtRemedialAction::CountertradeRemedialAction with**
2713 **other classes**

mult from	name	mult to	type	description
0..1	CountertradeScheduleAction	0..*	CountertradeScheduleAction	(NC) Countertrade schedule action which belongs to a countertrade remedial action.
0..*	BiddingZone	0..1	BiddingZone	(NC) inherited from: PowerRemedialAction
0..1	PowerBidSchedule	0..*	PowerBidSchedule	(NC) inherited from: PowerRemedialAction
0..1	GenericValueSchedule	0..*	GenericValueSchedule	(NC) inherited from: PowerRemedialAction
0..1	PowerSchedule	0..1	PowerSchedule	(NC) inherited from: PowerRemedialAction

mult from	name	mult to	type	description
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) inherited from: RemedialAction
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: RemedialAction
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) inherited from: RemedialAction
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) inherited from: RemedialAction
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToRegion	0..1	Region	(NC) inherited from: RemedialAction
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) inherited from: RemedialAction
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) inherited from: RemedialAction
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: RemedialAction
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialAction
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: RemedialAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.7 (NC) CountertradeScheduleAction

Inheritance path = PowerScheduleAction : IdentifiedObject : ExtEuIdentifiedObject
Countertrade schedule action is an action to rearrange power schedules based on a Generation and Load Shift Key (GLSK) strategy.
Table 261 shows all attributes of CountertradeScheduleAction.

Table 261 – Attributes of ExtRemedialAction::CountertradeScheduleAction

name	mult	type	description
currency	0..1	Currency	(NC) inherited from: PowerScheduleAction
energyPrice	0..1	Decimal	(NC) inherited from: PowerScheduleAction
available	0..1	Boolean	(NC) inherited from: PowerScheduleAction
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

Table 262 shows all association ends of CountertradeScheduleAction with other classes.

Table 262 – Association ends of ExtRemedialAction::CountertradeScheduleAction with other classes

mult from	name	mult to	type	description
0..*	CountertradeRemedialAction	0..1	CountertradeRemedialAction	(NC) Countertrade remedial action which has associated countertrade schedule actions.
0..1	PowerBidSchedule	0..1	PowerBidSchedule	(NC) inherited from: PowerScheduleAction
0..1	PowerSchedule	0..1	PowerSchedule	(NC) inherited from: PowerScheduleAction
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) inherited from: PowerScheduleAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.8 (NC) ControlFunctionBlockAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Action for setting the control function block target values.

Table 263 shows all attributes of ControlFunctionBlockAction.

Table 263 – Attributes of ExtRemedialAction::ControlFunctionBlockAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 264 shows all association ends of ControlFunctionBlockAction with other classes.

Table 264 – Association ends of ExtRemedialAction::ControlFunctionBlockAction with other classes

mult from	name	mult to	type	description
0..*	ControlFunctionBlock	1..1	ControlFunctionBlock	(NC) The control function block that is associated with a ControlFunctionBlockAction.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.9 (NC) EnergySourceModification

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Energy source action.

Table 265 shows all attributes of EnergySourceModification.

Table 265 – Attributes of ExtRemedialAction::EnergySourceModification

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 266 shows all association ends of EnergySourceModification with other classes.

Table 266 – Association ends of ExtRemedialAction::EnergySourceModification with other classes

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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.10 (NC) EquipmentControllerAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Action for setting the equipment controller action.

Table 267 shows all attributes of EquipmentControllerAction.

Table 267 – Attributes of ExtRemedialAction::EquipmentControllerAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 268 shows all association ends of EquipmentControllerAction with other classes.

Table 268 – Association ends of ExtRemedialAction::EquipmentControllerAction with other classes

mult from	name	mult to	type	description
0..*	EquipmentController	1..1	EquipmentController	(NC) Equipment controller that has associated equipment controller actions.
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.11 (NC) EquivalentInjectionAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Equivalent injection action.

Table 269 shows all attributes of EquivalentInjectionAction.

Table 269 – Attributes of ExtRemedialAction::EquivalentInjectionAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 270 shows all association ends of EquivalentInjectionAction with other classes.

Table 270 – Association ends of ExtRemedialAction::EquivalentInjectionAction with other classes

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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.12 (NC) ExternalNetworkInjectionAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

External network injection action.

Table 271 shows all attributes of ExternalNetworkInjectionAction.

Table 271 – Attributes of ExtRemedialAction::ExternalNetworkInjectionAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 272 shows all association ends of ExternalNetworkInjectionAction with other classes.

Table 272 – Association ends of ExtRemedialAction::ExternalNetworkInjectionAction with other classes

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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.13 (NC) GridStateAlteration

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

Grid state alteration is a change of values describing state (operating point) of one element in the grid model compared to the base case.

Table 273 shows all attributes of GridStateAlteration.

Table 273 – 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/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

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

Table 274 shows all association ends of GridStateAlteration with other classes.

Table 274 – Association ends of ExtRemedialAction::GridStateAlteration with other classes

mult from	name	mult to	type	description
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) Availability enabled describes the enabling or disabling of this grid state alteration.
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) Enabling schedule associated to a grid state alteration.
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) The grid state alteration remedial action associated with a given grid state alteration.
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) The controllable quantity associated with this grid state alteration.
0..*	PropertyReference	0..1	PropertyReference	(NC) The property reference for this grid state alteration.
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) The collection that has a GridStateAlteration.
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) The intensity associated with a given GridStateAlterationSchedule.
0..1	RangeConstraint	0..*	RangeConstraint	(NC) The range constraint associated with a given GridStateAlteration.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.14 (NC) GridStateAlterationRemedialAction

Inheritance path = RemedialAction : IdentifiedObject : ExtEuIdentifiedObject

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.

Table 275 shows all attributes of GridStateAlterationRemedialAction.

Table 275 – Attributes of ExtRemedialAction::GridStateAlterationRemedialAction

name	mult	type	description
available	0..1	Boolean	(NC) inherited from: RemedialAction
kind	0..1	RemedialActionKind	(NC) inherited from: RemedialAction
penaltyFactor	0..1	Float	(NC) inherited from: RemedialAction
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: RemedialAction
isManual	0..1	Boolean	(NC) inherited from: RemedialAction
timeToImplement	0..1	Duration	(NC) inherited from: RemedialAction
normalAvailable	0..1	Boolean	(NC) inherited from: RemedialAction
impactThresholdMargin	0..1	PerCent	(NC) inherited from: RemedialAction
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

Table 276 shows all association ends of GridStateAlterationRemedialAction with other classes.

Table 276 – Association ends of ExtRemedialAction::GridStateAlterationRemedialAction with other classes

mult from	name	mult to	type	description
0..1	GridStateAlteration	0..*	GridStateAlteration	(NC) The grid state alteration which is part of the grid state alteration remedial action.
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) inherited from: RemedialAction
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: RemedialAction
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) inherited from: RemedialAction
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) inherited from: RemedialAction
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToRegion	0..1	Region	(NC) inherited from: RemedialAction
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) inherited from: RemedialAction
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) inherited from: RemedialAction

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

3.15.15 (NC) GridStateIntensitySchedule

Inheritance path = GenericValueSchedule : BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Defines the intensity applied for a given grid state alteration. It is primarily used in exchanges related to the remedial action schedule. The value provided by the schedule replaces the value of the attribute to which the schedule refers to.

Table 277 shows all attributes of GridStateIntensitySchedule.

Table 277 – Attributes of ExtRemedialAction::GridStateIntensitySchedule

name	mult	type	description
valueKind	0..1	ValueOffsetKind	(NC) The kind of value1 and value2 of the associated IrregularIntervalSchedule.
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

Table 278 shows all association ends of GridStateIntensitySchedule with other classes.

Table 278 – Association ends of ExtRemedialAction::GridStateIntensitySchedule with other classes

mult from	name	mult to	type	description
0..*	GridStateAlteration	1..1	GridStateAlteration	(NC) The grid state alteration which has intensity.
0..*	PropertyReference	0..1	PropertyReference	(NC) The property reference for this grid schedule.

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

3.15.16 (NC) IntertemporalPropertyRange

Inheritance path = RangeConstraint : IdentifiedObject : ExtEuIdentifiedObject

It represents the intertemporal range, which means that this is the maximum change of an attribute value between two time stamps or per time unit (e.g. hour). Both up and down directions are defined by the direction attribute, i.e. There are different schedules per direction. The class is not instantiated for PropertyReference which refers to Boolean type attributes.

For instance the following example illustrates the approach:

- A tap changer related grid state alteration having two intertemporal range schedules.
- For a particular point in time, the value from up schedule is 6 and the value from down schedule is 3.
- Then, the GridStateIntensity for the same point in time cannot be more than plus 6 taps from the current, or more than minus 3 taps from the current.

Table 279 shows all attributes of IntertemporalPropertyRange.

Table 279 – Attributes of ExtRemedialAction::IntertemporalPropertyRange

name	mult	type	description
valueKind	0..1	ValueOffsetKind	(NC) inherited from: RangeConstraint
direction	0..1	RelativeDirectionKind	(NC) inherited from: RangeConstraint
value	0..1	Float	(NC) inherited from: RangeConstraint
normalValue	0..1	Float	(NC) inherited from: RangeConstraint
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

Table 280 shows all association ends of IntertemporalPropertyRange with other classes.

Table 280 – Association ends of ExtRemedialAction::IntertemporalPropertyRange with other classes

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

3.15.17 (NC) LoadAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Load action.

Table 281 shows all attributes of LoadAction.

Table 281 – Attributes of ExtRemedialAction::LoadAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 282 shows all association ends of LoadAction with other classes.

Table 282 – 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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration

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

3.15.18 (NC) PowerElectronicsConnectionAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Power electronics setpoint action.

Table 283 shows all attributes of PowerElectronicsConnectionAction.

Table 283 – Attributes of ExtRemedialAction::PowerElectronicsConnectionAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 284 shows all association ends of PowerElectronicsConnectionAction with other classes.

Table 284 – 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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration

mult from	name	mult to	type	description
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.19 (NC) PowerRemedialAction

Inheritance path = RemedialAction : IdentifiedObject : ExtEuIdentifiedObject
Energy remedial action describes actions to rearrange power schedules.
Table 285 shows all attributes of PowerRemedialAction.

Table 285 – 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: RemedialAction
kind	0..1	RemedialActionKind	(NC) inherited from: RemedialAction
penaltyFactor	0..1	Float	(NC) inherited from: RemedialAction
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: RemedialAction
isManual	0..1	Boolean	(NC) inherited from: RemedialAction
timeToImplement	0..1	Duration	(NC) inherited from: RemedialAction
normalAvailable	0..1	Boolean	(NC) inherited from: RemedialAction
impactThresholdMargin	0..1	PerCent	(NC) inherited from: RemedialAction
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

Table 286 shows all association ends of PowerRemedialAction with other classes.

Table 286 – Association ends of ExtRemedialAction::PowerRemedialAction with other classes

mult from	name	mult to	type	description
0..*	BiddingZone	0..1	BiddingZone	(NC) The Bidding Zone where the power remedial action is done.
0..1	PowerBidSchedule	0..*	PowerBidSchedule	(NC) Power bid schedule addressing the power remedial action.
0..1	GenericValueSchedule	0..*	GenericValueSchedule	(NC) Generic value schedule which has an power remedial action.
0..1	PowerSchedule	0..1	PowerSchedule	(NC) Power schedule which contains the power remedial action.
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) inherited from: RemedialAction
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: RemedialAction
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) inherited from: RemedialAction
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) inherited from: RemedialAction
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToRegion	0..1	Region	(NC) inherited from: RemedialAction
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) inherited from: RemedialAction
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) inherited from: RemedialAction
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: RemedialAction
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialAction
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: RemedialAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.20 (NC) PowerScheduleAction

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

Power schedule action is an action to rearrange power schedules.

Table 287 shows all attributes of PowerScheduleAction.

Table 287 – 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.

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

Table 288 shows all association ends of PowerScheduleAction with other classes.

Table 288 – Association ends of ExtRemedialAction::PowerScheduleAction with other classes

mult from	name	mult to	type	description
0..1	PowerBidSchedule	0..1	PowerBidSchedule	(NC) The power bid schedule which contains the power schedule action.
0..1	PowerSchedule	0..1	PowerSchedule	(NC) Power schedule which contains the power schedule action.
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) Remedial action schedule which power schedule actions.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.21 (NC) PropertyReference root class

The reference to a class and one of its properties.
Table 289 shows all attributes of PropertyReference.

Table 289 – 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.

Table 290 shows all association ends of PropertyReference with other classes.

Table 290 – Association ends of ExtRemedialAction::PropertyReference with other classes

mult from	name	mult to	type	description
0..1	GridStateAlteration	0..*	GridStateAlteration	(NC) The grid state alteration for this property reference.
0..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) The grid schedule for this property reference.
1..1	PinEquipment	0..*	PinEquipment	(NC) The pin equipment that has this property reference.
1..1	StaticPropertyRange	0..*	StaticPropertyRange	Static property range that has this property reference.
0..1	FunctionOutputVariable	0..*	FunctionOutputVariable	(NC) Function output variable is the function output this property reference is used in.

3.15.22 (NC) ProposingRemedialActionScheduleShare root class

Proposing entity (System Operator) with a proper cost share for a given remedial action schedule.

Table 291 shows all attributes of ProposingRemedialActionScheduleShare.

Table 291 – 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.

Table 292 shows all association ends of ProposingRemedialActionScheduleShare with other classes.

Table 292 – Association ends of ExtRemedialAction::ProposingRemedialActionScheduleShare with other classes

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) Remedial action schedule proposed by the proposing entity.
0..*	ProposingEntity	0..1	SystemOperator	(NC) Proposing entity making the proposing remedial action schedule share.

3.15.23 (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 293 shows all attributes of QualitativeRemedialActionImpact.

Table 293 – Attributes of ExtRemedialAction::QualitativeRemedialActionImpact

name	mult	type	description
impactQuantity	0..1	Float	(NC) inherited from: RemedialActionImpact
kind	0..1	ImpactAgreementKind	(NC) inherited from: RemedialActionImpact
mRID	0..1	String	(NC) inherited from: RemedialActionImpact

Table 294 shows all association ends of QualitativeRemedialActionImpact with other classes.

Table 294 – Association ends of ExtRemedialAction::QualitativeRemedialActionImpact with other classes

mult from	name	mult to	type	description
0..*	RemedialAction	0..1	RemedialAction	(NC) inherited from: RemedialActionImpact
0..*	AssessingSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialActionImpact
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) inherited from: RemedialActionImpact

3.15.24 (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 coursed an impact of an element that is monitored by the assessed system operator higher than the relevant threshold for the conducting equipment.
Table 295 shows all attributes of QuantitativeRemedialActionImpact.

Table 295 – Attributes of ExtRemedialAction::QuantitativeRemedialActionImpact

name	mult	type	description
impactQuantity	0..1	Float	(NC) inherited from: RemedialActionImpact
kind	0..1	ImpactAgreementKind	(NC) inherited from: RemedialActionImpact
mRID	0..1	String	(NC) inherited from: RemedialActionImpact

Table 296 shows all association ends of QuantitativeRemedialActionImpact with other classes.

Table 296 – Association ends of ExtRemedialAction::QuantitativeRemedialActionImpact with other classes

mult from	name	mult to	type	description
0..*	SensitivityArea	0..1	SensitivityArea	(NC) Sensitivity area which should be monitored to evaluate the threshold given by the remedial action impact on relevant equipment.
0..*	RemedialAction	0..1	RemedialAction	(NC) inherited from: RemedialActionImpact
0..*	AssessingSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialActionImpact

mult from	name	mult to	type	description
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) inherited from: RemedialActionImpact

3.15.25 (NC) RangeConstraint

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

Defines the rage constraint.

Table 297 shows all attributes of RangeConstraint.

Table 297 – Attributes of ExtRemedialAction::RangeConstraint

name	mult	type	description
valueKind	0..1	ValueOffsetKind	(NC) Kind of value offset for the range that applies to the attribute referenced by the PropertyReference.
direction	0..1	RelativeDirectionKind	(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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 298 shows all association ends of RangeConstraint with other classes.

Table 298 – Association ends of ExtRemedialAction::RangeConstraint with other classes

mult from	name	mult to	type	description
0..*	GridStateAlteration	0..1	GridStateAlteration	(NC) The grid state alteration which has static range.
0..1	GenericValueSchedule	0..*	GenericValueSchedule	(NC) Generic value schedule which has a range constraint.

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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.26 (NC) RedispatchScheduleAction

Inheritance path = PowerScheduleAction : IdentifiedObject : ExtEuIdentifiedObject
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.
Table 299 shows all attributes of RedispatchScheduleAction.

Table 299 – Attributes of ExtRemedialAction::RedispatchScheduleAction

name	mult	type	description
currency	0..1	Currency	(NC) inherited from: PowerScheduleAction
energyPrice	0..1	Decimal	(NC) inherited from: PowerScheduleAction
available	0..1	Boolean	(NC) inherited from: PowerScheduleAction
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

Table 300 shows all association ends of RedispatchScheduleAction with other classes.

Table 300 – Association ends of ExtRemedialAction::RedispatchScheduleAction with other classes

mult from	name	mult to	type	description
0..*	ScheduleResource	0..1	ScheduleResource	(NC) The schedule resource that has this redispatch action.
0..*	RedispatchRemedialAction	0..1	RedispatchRemedialAction	(NC) Redispatch remedial action that is supported by the redispatch schedule action.
0..1	PowerBidSchedule	0..1	PowerBidSchedule	(NC) inherited from: PowerScheduleAction
0..1	PowerSchedule	0..1	PowerSchedule	(NC) inherited from: PowerScheduleAction
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) inherited from: PowerScheduleAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.27 (NC) RedispatchRemedialAction

Inheritance path = PowerRemedialAction : RemedialAction : IdentifiedObject : ExtEuIdentifiedObject

Redispatch remedial action is a remedial action that through rearranging power schedules is eliminating breaches of constraints.

Table 301 shows all attributes of RedispatchRemedialAction.

Table 301 – Attributes of ExtRemedialAction::RedispatchRemedialAction

name	mult	type	description
maxRegulatingDown	0..1	ActivePower	(NC) inherited from: PowerRemedialAction
maxRegulatingUp	0..1	ActivePower	(NC) inherited from: PowerRemedialAction
available	0..1	Boolean	(NC) inherited from: RemedialAction
kind	0..1	RemedialActionKind	(NC) inherited from: RemedialAction
penaltyFactor	0..1	Float	(NC) inherited from: RemedialAction
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: RemedialAction
isManual	0..1	Boolean	(NC) inherited from: RemedialAction
timeToImplement	0..1	Duration	(NC) inherited from: RemedialAction
normalAvailable	0..1	Boolean	(NC) inherited from: RemedialAction
impactThresholdMargin	0..1	PerCent	(NC) inherited from: RemedialAction
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

Table 302 shows all association ends of RedispatchRemedialAction with other classes.

Table 302 – Association ends of ExtRemedialAction::RedispatchRemedialAction with other classes

mult from	name	mult to	type	description
0..1	RedispatchScheduleAction	0..*	RedispatchScheduleAction	(NC) Redispatch schedule action which belongs to the redispatch remedial action.
0..*	BiddingZone	0..1	BiddingZone	(NC) inherited from: PowerRemedialAction
0..1	PowerBidSchedule	0..*	PowerBidSchedule	(NC) inherited from: PowerRemedialAction
0..1	GenericValueSchedule	0..*	GenericValueSchedule	(NC) inherited from: PowerRemedialAction
0..1	PowerSchedule	0..1	PowerSchedule	(NC) inherited from: PowerRemedialAction
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) inherited from: RemedialAction
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: RemedialAction

mult from	name	mult to	type	description
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) inherited from: RemedialAction
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) inherited from: RemedialAction
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToRegion	0..1	Region	(NC) inherited from: RemedialAction
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) inherited from: RemedialAction
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) inherited from: RemedialAction
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: RemedialAction
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialAction
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: RemedialAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.28 (NC) RegulatingControlAction

Inheritance path = GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject
Control action means the set point change of a regulating control power system resource in the grid model compared to the base case.
Table 303 shows all attributes of RegulatingControlAction.

Table 303 – Attributes of ExtRemedialAction::RegulatingControlAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 304 shows all association ends of RegulatingControlAction with other classes.

2960 **Table 304 – Association ends of ExtRemedialAction::RegulatingControlAction with**
2961 **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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

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2963 ### 3.15.29 (NC) RemedialAction

2964 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
2965 Remedial action describes one or more actions that can be performed on a given power system
2966 model situation to eliminate one or more identified breaches of constraints. The remedial action
2967 can be costly, and have a cost characteristic, or non costly.
2968 Table 305 shows all attributes of RemedialAction.

2969 **Table 305 – 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	RemedialActionKind	(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 – Incremental Transmission Loss). In a similar way remedial action using

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

2970

2971 Table 306 shows all association ends of RemedialAction with other classes.

2972 **Table 306 – Association ends of ExtRemedialAction::RemedialAction with other classes**

mult from	name	mult to	type	description
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) The contingency and remedial action combination.
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) The remedial action schedule associated with a remedial action, i.e. the assigning a schedule to a remedial action.
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) Remedial action dependent on a remedial action.
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) Available schedule associated to a remedial action.
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) The impacted overlapping zone for this impacting remedial action.
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) The overlapping zone appointed to the remedial action.
0..*	AppointedToRegion	0..1	Region	(NC) The region in which the remedial action is appointed.
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) The assessed element and remedial action combination to be simulated for this remedial action.

mult from	name	mult to	type	description
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) The remedial action outcome value associated with a remedial action.
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) The controllable quantity for a remedial action.
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) System operator operating remedial actions.
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) This is the impact for a given remedial action.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.30 (NC) RemedialActionCost root class

Remedial action cost is the total cost itemised cost by category and type for the remedial action. Table 307 shows all attributes of RemedialActionCost.

Table 307 – 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	CostSettledKind	(NC) Remedial action cost category related to the confirmation of the cost in regards to changes.
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

name	mult	type	description
			or rdf:about attributes that identify CIM object elements.

Table 308 shows all association ends of RemedialActionCost with other classes.

Table 308 – Association ends of ExtRemedialAction::RemedialActionCost with other classes

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) Remedial action schedule for which this remedial action cost relates to.

3.15.31 (NC) RemedialActionDependency root class

Remedial action dependency is making two remedial actions depending on each other. Multiple dependency is done by multiple instances of this class. The dependency can arrive by having one of the following examples.
- The dependent remedial action is controlled by different system operator (Modeling Authority) (e.g. SIPS that goes across control area).
- The dependent remedial action is representing two or more remedial action that represent the same grid state alteration but with different modeling resolution (e.g. detail direct current model versus a simplified model).
- The remedial action can be combined with other remedial action without the need to create multiple remedial action with the same grid alteration for enabling dependency.

Table 309 shows all attributes of RemedialActionDependency.

Table 309 – Attributes of ExtRemedialAction::RemedialActionDependency

name	mult	type	description
kind	0..1	RemedialActionDependencyKind	(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.

Table 310 shows all association ends of RemedialActionDependency with other classes.

Table 310 – Association ends of ExtRemedialAction::RemedialActionDependency with other classes

mult from	name	mult to	type	description
0..*	DependingRemedialActionGroup	0..1	RemedialActionGroup	(NC) Remedial action group which the remedial action is depending on.

mult from	name	mult to	type	description
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) Enabling schedule associated to a remedial action dependency.
0..*	RemedialAction	0..1	RemedialAction	(NC) Remedial action which has dependent remedial actions.

3.15.32 (NC) RemedialActionGroup

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Grouping of remedial actions that can be operated together.
Table 311 shows all attributes of RemedialActionGroup.

Table 311 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 312 shows all association ends of RemedialActionGroup with other classes.

Table 312 – Association ends of ExtRemedialAction::RemedialActionGroup with other classes

mult from	name	mult to	type	description
0..1	RemedialAction	0..*	RemedialActionDependency	(NC) Remedial action dependecy on a remedial action group.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.33 (NC) RemedialActionImpact root class

Remedial action impact assessment based on a given agreement with a specific system operator.
Table 313 shows all attributes of RemedialActionImpact.

Table 313 – 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

name	mult	type	description
			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	ImpactAgreementKind	(NC) The impact agreement kind.
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.

Table 314 shows all association ends of RemedialActionImpact with other classes.

Table 314 – Association ends of ExtRemedialAction::RemedialActionImpact with other classes

mult from	name	mult to	type	description
0..*	RemedialAction	0..1	RemedialAction	(NC) The remedial action that has an impact.
0..*	AssessingSystemOperator	0..1	SystemOperator	(NC) The impacted System Operator that assigns a remedial action impact.
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) The owner's assessment to the impacted system operator.

3.15.34 (NC) RemedialActionSchedule

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
A schedule for a determined remedial action.
Table 315 shows all attributes of RemedialActionSchedule.

Table 315 – Attributes of ExtRemedialAction::RemedialActionSchedule

name	mult	type	description
statusKind	0..1	RemedialActionScheduleStatusKind	(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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 316 shows all association ends of RemedialActionSchedule with other classes.

Table 316 – Association ends of ExtRemedialAction::RemedialActionSchedule with other classes

mult from	name	mult to	type	description
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) The entity with its associated share that are making the proposal of the remedial action schedule
0..1	EventSchedule	0..1	EventSchedule	Event schedule that describes the validity of the remedial action schedule.
0..*	ProposingEntity	0..1	SecurityCoordinator	(NC) The security coordinator that is proposing this remedial action schedule.
0..*	Contingency	0..1	Contingency	(NC) The contingency for a curative remedial action schedule.
0..*	RemedialActionScheduleGroup	0..1	RemedialActionScheduleGroup	(NC) Remedial action schedule group in which the remedial action schedule is allocated.
0..*	OverlappingZone	0..1	OverlappingZone	(NC) The overlapping zone for this overlapping remedial action schedule.
0..*	AssignedRegion	0..1	Region	(NC) The assigned region for this remedial action schedule.
0..1	RemedialActionScheduleOutcomeValue	0..*	RemedialActionScheduleOutcomeValue	(NC) The remedial action schedule outcome value associated with a remedial action schedule.
0..1	PowerScheduleAction	0..*	PowerScheduleAction	(NC) Power schedule action which belongs to a remedial action schedule.
0..*	RemedialAction	1..1	RemedialAction	(NC) The remedial action that has a remedial action schedule associated.
0..1	RemedialActionCost	0..*	RemedialActionCost	(NC) Remedial action cost related to this remedial schedule.
0..1	RemedialActionScheduleAcceptance	0..*	RemedialActionScheduleAcceptance	(NC) The remedial action schedule acceptance related to a remedial action schedule.
0..1	GenericValueSchedule	0..*	GenericValueSchedule	(NC) Generic value schedule which belongs to a remedial action schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.35 (NC) RemedialActionScheduleAcceptance root class

It identifies if the remedial action schedule is accepted for a given system operator.
Table 317 shows all attributes of RemedialActionScheduleAcceptance.

Table 317 – Attributes of ExtRemedialAction::RemedialActionScheduleAcceptance

name	mult	type	description
kind	0..1	RemedialActionScheduleAcceptanceKind	(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.

Table 318 shows all association ends of RemedialActionScheduleAcceptance with other classes.

Table 318 – Association ends of ExtRemedialAction::RemedialActionScheduleAcceptance with other classes

mult from	name	mult to	type	description
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) A remedial action schedule for which a remedial action schedule acceptance is reported.
0..*	SystemOperator	0..1	SystemOperator	(NC) A system operator for which a remedial action schedule acceptances are reported.

3.15.36 (NC) RemedialActionScheduleGroup

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

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. All remedial actions in a group must have the same activation time.

Table 319 shows all attributes of RemedialActionScheduleGroup.

Table 319 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 320 shows all association ends of RemedialActionScheduleGroup with other classes.

Table 320 – Association ends of ExtRemedialAction::RemedialActionScheduleGroup with other classes

mult from	name	mult to	type	description
0..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) Remedial action schedule included in the remedial action schedule group.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	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

3.15.37 (NC) RotatingMachineAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Rotating machine action.

Table 321 shows all attributes of RotatingMachineAction.

Table 321 – Attributes of ExtRemedialAction::RotatingMachineAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 322 shows all association ends of RotatingMachineAction with other classes.

Table 322 – Association ends of ExtRemedialAction::RotatingMachineAction with other 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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.38 (NC) SetPointAction

Inheritance path = GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Setpoint action.

Table 323 shows all attributes of SetPointAction.

Table 323 – Attributes of ExtRemedialAction::SetPointAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 324 shows all association ends of SetPointAction with other classes.

Table 324 – Association ends of ExtRemedialAction::SetPointAction with other classes

mult from	name	mult to	type	description
0..1	AvailabilityEnabled	0..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.39 (NC) SchemeRemedialAction

Inheritance path = RemedialAction : IdentifiedObject : ExtEuIdentifiedObject
Scheme remedial action is remedial action that involves a scheme that can include conditional logic and stages of grid alteration. The primary remedial action is the arming of these schemes, that will then perform curative remedial action when the condition is met. System Integrity Protection Scheme (SIPS) and Special Protection Scheme (SPS) are example of this.
Table 325 shows all attributes of SchemeRemedialAction.

Table 325 – Attributes of ExtRemedialAction::SchemeRemedialAction

name	mult	type	description
available	0..1	Boolean	(NC) inherited from: RemedialAction
kind	0..1	RemedialActionKind	(NC) inherited from: RemedialAction
penaltyFactor	0..1	Float	(NC) inherited from: RemedialAction
isCrossBorderRelevant	0..1	Boolean	(NC) inherited from: RemedialAction
isManual	0..1	Boolean	(NC) inherited from: RemedialAction
timeToImplement	0..1	Duration	(NC) inherited from: RemedialAction
normalAvailable	0..1	Boolean	(NC) inherited from: RemedialAction
impactThresholdMargin	0..1	PerCent	(NC) inherited from: RemedialAction
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

Table 326 shows all association ends of SchemeRemedialAction with other classes.

Table 326 – Association ends of ExtRemedialAction::SchemeRemedialAction with other classes

mult from	name	mult to	type	description
0..1	RemedialActionScheme	0..1	RemedialActionScheme	(NC) Remedial action scheme that has this armed remedial action.
0..1	ContingencyWithRemedialAction	0..*	ContingencyWithRemedialAction	(NC) inherited from: RemedialAction
1..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) inherited from: RemedialAction
0..1	DependentRemedialAction	0..*	RemedialActionDependency	(NC) inherited from: RemedialAction
0..1	GenericAvailableSchedule	0..*	GenericAvailableSchedule	(NC) inherited from: RemedialAction

mult from	name	mult to	type	description
0..*	ImpactedOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToOverlappingZone	0..1	OverlappingZone	(NC) inherited from: RemedialAction
0..*	AppointedToRegion	0..1	Region	(NC) inherited from: RemedialAction
0..1	AssessedElementWithRemedialAction	0..*	AssessedElementWithRemedialAction	(NC) inherited from: RemedialAction
0..1	RemedialActionOutcomeValue	0..*	RemedialActionOutcomeValue	(NC) inherited from: RemedialAction
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: RemedialAction
0..*	RemedialActionSystemOperator	0..1	SystemOperator	(NC) inherited from: RemedialAction
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: RemedialAction
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.40 (NC) ShuntCompensatorModification

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Shunt compensator action.

Table 327 shows all attributes of ShuntCompensatorModification.

Table 327 – Attributes of ExtRemedialAction::ShuntCompensatorModification

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 328 shows all association ends of ShuntCompensatorModification with other classes.

Table 328 – Association ends of ExtRemedialAction::ShuntCompensatorModification 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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.41 (NC) StaticPropertyRange

Inheritance path = RangeConstraint : IdentifiedObject : ExtEuIdentifiedObject

Defines the static range, which means that this is the minimum and/or maximum of an attribute value. The value provided by the schedule replaces the value of the attribute to which the schedule refers to.

In case that the PropertyReference refers to Boolean type attributes, RangeConstraint.direction shall be none or upAndDown and the RangeConstraint.valueKind shall be absolute. If the direction is none then optimization of the attribute referenced by the PropertyReference is not possible if the current status is already as the value in the range. Otherwise if the direction is upAndDown, the optimization can change from true to false or vice versa independently of the initial value in the operational scenario.

For instance for a tap changer related grid state alteration for a particular point in time, if the range of TapChanger.step is to be restricted, the value of the schedule will represent that new TapChanger.step range.

Table 329 shows all attributes of StaticPropertyRange.

Table 329 – Attributes of ExtRemedialAction::StaticPropertyRange

name	mult	type	description
valueKind	0..1	ValueOffsetKind	(NC) inherited from: RangeConstraint
direction	0..1	RelativeDirectionKind	(NC) inherited from: RangeConstraint
value	0..1	Float	(NC) inherited from: RangeConstraint
normalValue	0..1	Float	(NC) inherited from: RangeConstraint
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 330 shows all association ends of StaticPropertyRange with other classes.

Table 330 – Association ends of ExtRemedialAction::StaticPropertyRange with other classes

mult from	name	mult to	type	description
0..*	PropertyReference	1..1	PropertyReference	Property reference for this static property range.
0..*	GridStateAlteration	0..1	GridStateAlteration	(NC) inherited from: RangeConstraint
0..1	GenericValueSchedule	0..*	GenericValueSchedule	(NC) inherited from: RangeConstraint
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.42 (NC) StaticVarCompensatorAction

Inheritance path = SetPointAction : GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Static Var compensator action.

Table 331 shows all attributes of StaticVarCompensatorAction.

Table 331 – Attributes of ExtRemedialAction::StaticVarCompensatorAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 332 shows all association ends of StaticVarCompensatorAction with other classes.

Table 332 – 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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.43 (NC) TapPositionAction

Inheritance path = GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Tap position action represents a change of a tap changer position in the grid model compared to the base case.

Table 333 shows all attributes of TapPositionAction.

Table 333 – Attributes of ExtRemedialAction::TapPositionAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 334 shows all association ends of TapPositionAction with other classes.

Table 334 – 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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.44 (NC) TopologyAction

Inheritance path = GridStateAlteration : IdentifiedObject : ExtEuIdentifiedObject

Topology action means the connection or disconnection of a switch in the grid model compared to the base case.

Table 335 shows all attributes of TopologyAction.

Table 335 – Attributes of ExtRemedialAction::TopologyAction

name	mult	type	description
enabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
normalEnabled	0..1	Boolean	(NC) inherited from: GridStateAlteration
participationFactor	0..1	PerCent	(NC) inherited from: GridStateAlteration
maximumPerDay	0..1	Integer	(NC) inherited from: GridStateAlteration
minimumActivation	0..1	Duration	(NC) inherited from: GridStateAlteration
timePerStage	0..1	Duration	(NC) inherited from: GridStateAlteration
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

Table 336 shows all association ends of TopologyAction with other classes.

Table 336 – 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..*	AvailabilityEnabled	(NC) inherited from: GridStateAlteration
0..1	GenericEnablingSchedule	0..*	GenericEnablingSchedule	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationRemedialAction	0..1	GridStateAlterationRemedialAction	(NC) inherited from: GridStateAlteration
0..1	ControllableQuantity	0..*	ControllableQuantity	(NC) inherited from: GridStateAlteration
0..*	PropertyReference	0..1	PropertyReference	(NC) inherited from: GridStateAlteration
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) inherited from: GridStateAlteration
1..1	GridStateIntensitySchedule	0..*	GridStateIntensitySchedule	(NC) inherited from: GridStateAlteration
0..1	RangeConstraint	0..*	RangeConstraint	(NC) inherited from: GridStateAlteration
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.15.45 (NC) BidDirectionKind enumeration

Kind of direction of the bid.
Table 337 shows all literals of BidDirectionKind.

Table 337 – 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.

3.15.46 (NC) CostSettledKind enumeration

Kind describing how settled the cost is in regards to changes.
Table 338 shows all literals of CostSettledKind.

Table 338 – 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.

3.15.47 (NC) GLSKStrategyKind enumeration

Kind of generating and load shift keys strategy.
Table 339 shows all literals of GLSKStrategyKind.

Table 339 – Literals of ExtRemedialAction::GLSKStrategyKind

literal	value	description
explicitInstruction		The distribution is done according to the individual participation factor on the unit.
explicitSchedule		The distribution is explicitly done according to the GLSK Energy Bid Schedule.
generatorFlat		Flat adjustment on all active generators.
loadFlat		Flat adjustment on all active loads.
generatorPmax		The distribution is relative to the maximum p of the generator.
proportionalForGenerator		The distribution is proportional to the generator active power in the given case.
proportionalForLoad		The distribution is proportional to the load active power in the given case.
proportionalForGeneratorAndLoad		The distribution is proportional to the generator and load active power in the given case.
proportionalForRemainingCapacity		The distribution is proportional to the remaining capacity for generators in the given case.

3.15.48 (NC) ImpactAgreementKind enumeration

The impact agreement for the remedial action.
Table 340 shows all literals of ImpactAgreementKind.

Table 340 – 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.

3.15.49 (NC) RelativeDirectionKind enumeration

Kinds of direction of the manual frequency restoration reserves action.
Table 341 shows all literals of RelativeDirectionKind.

Table 341 – Literals of ExtRemedialAction::RelativeDirectionKind

literal	value	description
up		Up signifies that the available power can be used by the purchasing area to increase energy.

literal	value	description
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.
none		There is no direction.

3.15.50 (NC) RemedialActionKind enumeration

The different kinds for a remedial action.
Table 342 shows all literals of RemedialActionKind.

Table 342 – 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.

3.15.51 (NC) RemedialActionDependencyKind enumeration

Kind of dependency between remedial actions.
Table 343 shows all literals of RemedialActionDependencyKind.

Table 343 – 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 action 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.
none		Remedial actions are not depending on each other. However, the two remedial actions should be evaluated together.

3.15.52 (NC) RemedialActionScheduleAcceptanceKind enumeration

The kind of acceptance for a remedial action schedule.
Table 344 shows all literals of RemedialActionScheduleAcceptanceKind.

Table 344 – 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.

3.15.53 (NC) RemedialActionScheduleStatusKind enumeration

Remedial action schedule status kinds.
Table 345 shows all literals of RemedialActionScheduleStatusKind.

Table 345 – 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.

3.15.54 (NC) ShiftMethodKind enumeration

Kind of shift method. Describes the way a power schedule should be distributed amongst production and consumption. e.g. Type of generating and load shift key.
Table 346 shows all literals of ShiftMethodKind.

Table 346 – 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

literal	value	description
		participation factor unit will be reduced to its min economy factor or minimum power.

3.15.55 (NC) ValueOffsetKind enumeration

The kind of the value offset.
Table 347 shows all literals of ValueOffsetKind.

Table 347 – 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.

3.16 Package ExtRole

3.16.1 General

This package contains the extensions related to the roles.

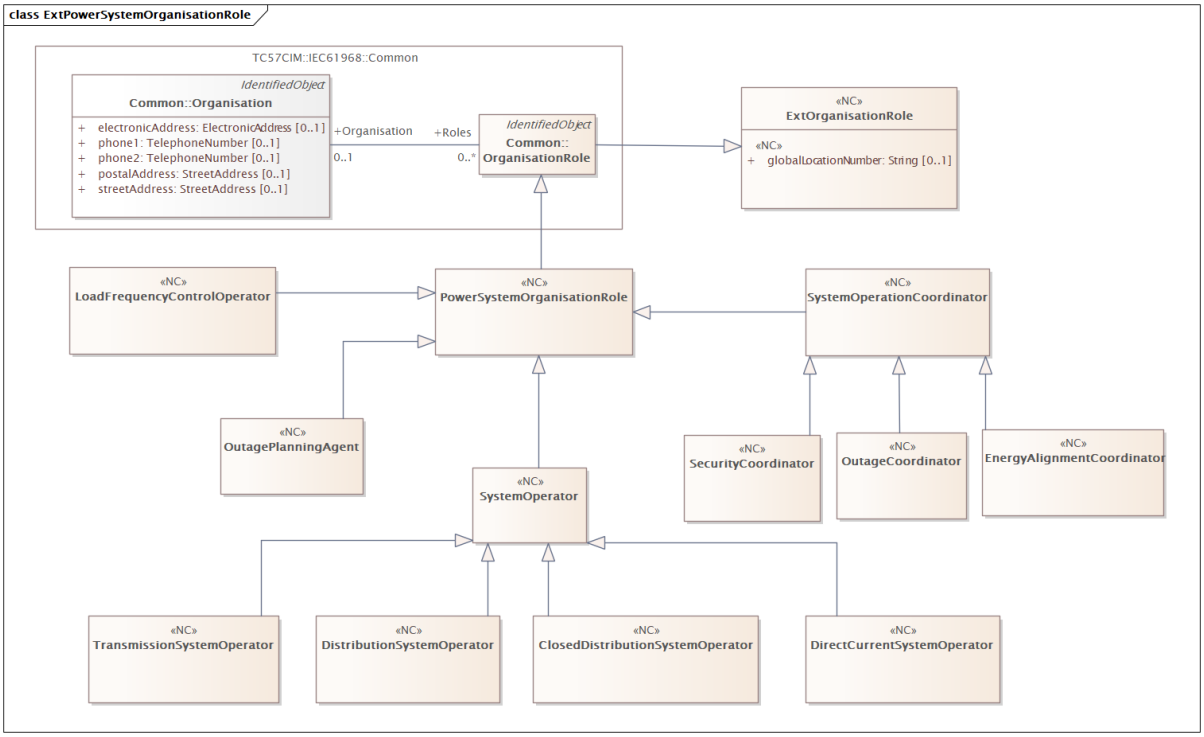

Figure 25 – Class diagram ExtRole::ExtPowerSystemOrganisationRole

Figure 25: The diagram contains classes related to power system organization role.

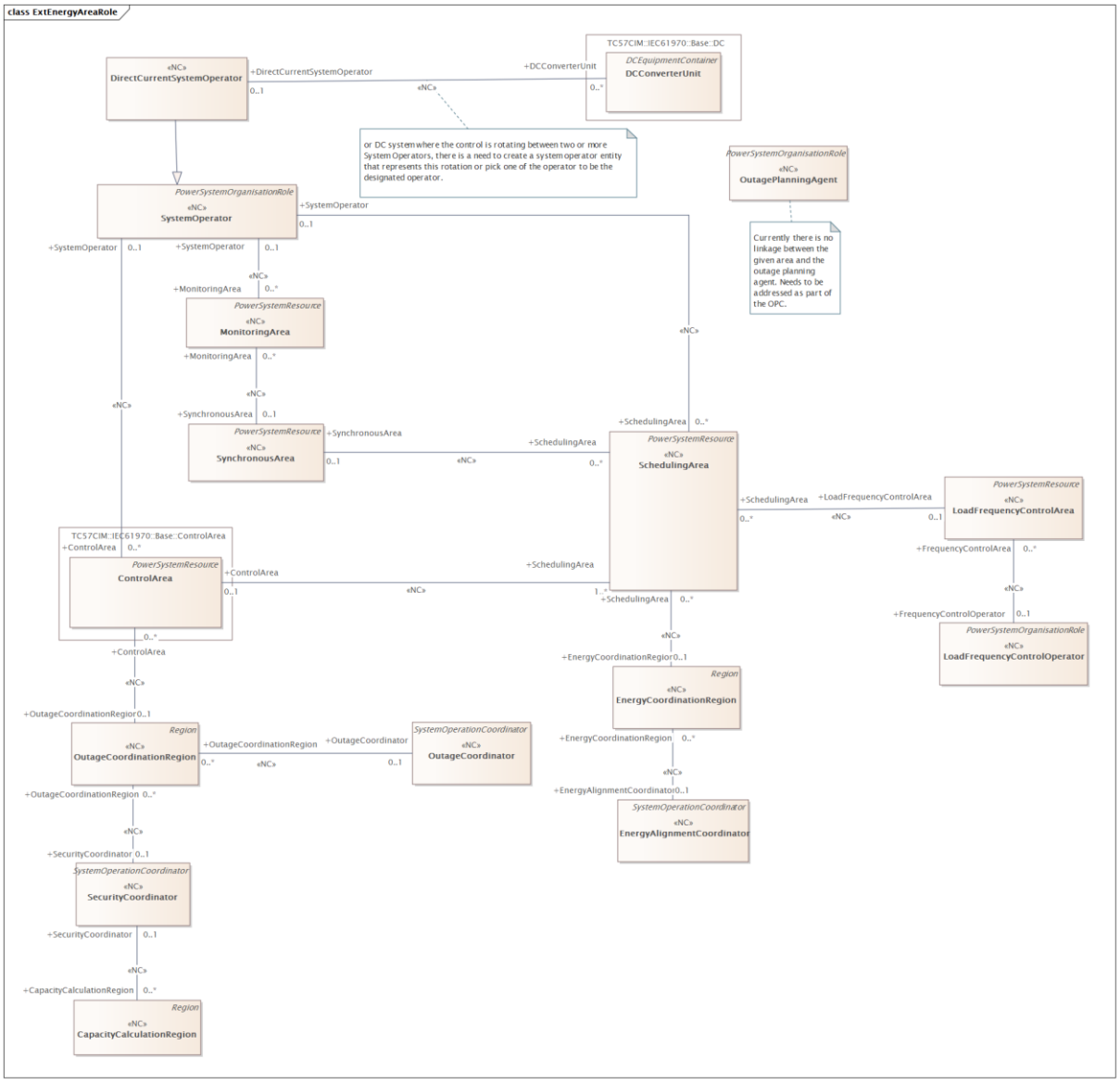

Figure 26 – Class diagram ExtRole::ExtEnergyAreaRole

Figure 26: The diagram contains classes related to energy area role.

3.16.2 (NC) ClosedDistributionSystemOperator

Inheritance path = SystemOperator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

A system operator which distributes electricity (or gas) within a geographically confined industrial, commercial or shared services and does not supply household customers.

Table 348 shows all attributes of ClosedDistributionSystemOperator.

Table 348 – 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

name	mult	type	description
energyIdentCodeEic	0..1	String	(European) inherited from: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 349 shows all association ends of ClosedDistributionSystemOperator with other classes.

Table 349 – Association ends of ExtRole::ClosedDistributionSystemOperator with other classes

mult from	name	mult to	type	description
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: SystemOperator
0..1	SchedulingArea	0..*	SchedulingArea	(NC) inherited from: SystemOperator
1..1	OutcomeValue	0..*	OutcomeValue	(NC) inherited from: SystemOperator
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) inherited from: SystemOperator
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: SystemOperator
0..1	ControlArea	0..*	ControlArea	(NC) inherited from: SystemOperator
0..1	Contingency	0..*	Contingency	(NC) inherited from: SystemOperator
0..1	Fault	0..*	Fault	(NC) inherited from: SystemOperator
0..1	AssessedElement	0..*	AssessedElement	(NC) inherited from: SystemOperator
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) inherited from: SystemOperator
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: SystemOperator
0..1	RemedialActionScheduleAcceptance	0..*	RemedialActionScheduleAcceptance	(NC) inherited from: SystemOperator
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.16.3 (NC) DirectCurrentSystemOperator

Inheritance path = SystemOperator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

System operator of the direct current pole. There are typically one or two system operators that are operating either the control area at one side or the control areas at both sides of the direct current pole. In some cases it is operated by an operator from the connected control areas.

Table 350 shows all attributes of DirectCurrentSystemOperator.

Table 350 – Attributes of ExtRole::DirectCurrentSystemOperator

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 351 shows all association ends of DirectCurrentSystemOperator with other classes.

Table 351 – 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	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: SystemOperator
0..1	SchedulingArea	0..*	SchedulingArea	(NC) inherited from: SystemOperator
1..1	OutcomeValue	0..*	OutcomeValue	(NC) inherited from: SystemOperator
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) inherited from: SystemOperator
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: SystemOperator
0..1	ControlArea	0..*	ControlArea	(NC) inherited from: SystemOperator
0..1	Contingency	0..*	Contingency	(NC) inherited from: SystemOperator
0..1	Fault	0..*	Fault	(NC) inherited from: SystemOperator
0..1	AssessedElement	0..*	AssessedElement	(NC) inherited from: SystemOperator
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) inherited from: SystemOperator
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: SystemOperator
0..1	RemedialActionScheduleAcceptance	0..*	RemedialActionScheduleAcceptance	(NC) inherited from: SystemOperator
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.16.4 (NC) DistributionSystemOperator

Inheritance path = SystemOperator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

A system operator that is responsible for operating of energy distribution network from transmission level down to low voltage levels including the connection to household.

Table 352 shows all attributes of DistributionSystemOperator.

Table 352 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 353 shows all association ends of DistributionSystemOperator with other classes.

Table 353 – Association ends of ExtRole::DistributionSystemOperator with other classes

mult from	name	mult to	type	description
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: SystemOperator
0..1	SchedulingArea	0..*	SchedulingArea	(NC) inherited from: SystemOperator
1..1	OutcomeValue	0..*	OutcomeValue	(NC) inherited from: SystemOperator
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) inherited from: SystemOperator
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: SystemOperator
0..1	ControlArea	0..*	ControlArea	(NC) inherited from: SystemOperator
0..1	Contingency	0..*	Contingency	(NC) inherited from: SystemOperator
0..1	Fault	0..*	Fault	(NC) inherited from: SystemOperator
0..1	AssessedElement	0..*	AssessedElement	(NC) inherited from: SystemOperator
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) inherited from: SystemOperator
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) inherited from: SystemOperator
0..1	RemedialActionScheduleAcceptance	0..*	RemedialActionScheduleAcceptance	(NC) inherited from: SystemOperator
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.16.5 (NC) EnergyAlignmentCoordinator

Inheritance path = SystemOperationCoordinator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

A role that is responsible for alignment of forecast and schedule energy to a given energy coordination region.

Table 354 shows all attributes of EnergyAlignmentCoordinator.

Table 354 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 355 shows all association ends of EnergyAlignmentCoordinator with other classes.

Table 355 – Association ends of ExtRole::EnergyAlignmentCoordinator with other classes

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

3.16.6 (NC) ExtOrganisationRole root class

Organisation role NC extension class.
Table 356 shows all attributes of ExtOrganisationRole.

Table 356 – 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.

3.16.7 (NC) LoadFrequencyControlOperator

Inheritance path = PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole
A role that is responsible for operational security by operating the load frequency control (LFC) mechanism.
Table 357 shows all attributes of LoadFrequencyControlOperator.

Table 357 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 358 shows all association ends of LoadFrequencyControlOperator with other classes.

Table 358 – Association ends of ExtRole::LoadFrequencyControlOperator with other classes

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

3.16.8 (NC) OutageCoordinator

Inheritance path = SystemOperationCoordinator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole
A role that coordinates the planned availability status of relevant power system equipment to meet the need by the asset owner or operator and the security of the power system.
Table 359 shows all attributes of OutageCoordinator.

Table 359 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 360 shows all association ends of OutageCoordinator with other classes.

Table 360 – Association ends of ExtRole::OutageCoordinator with other classes

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

3.16.9 (NC) OutagePlanningAgent

Inheritance path = PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

An entity with the task of planning the availability status of a relevant power generating module, a relevant demand facility or a relevant grid element.

Table 361 shows all attributes of OutagePlanningAgent.

Table 361 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 362 shows all association ends of OutagePlanningAgent with other classes.

Table 362 – Association ends of ExtRole::OutagePlanningAgent with other 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.16.10 (NC) PowerSystemOrganisationRole

Inheritance path = OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

A role that is responsible for the functional operational of a power system resource.

Table 363 shows all attributes of PowerSystemOrganisationRole.

Table 363 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 364 shows all association ends of PowerSystemOrganisationRole with other classes.

Table 364 – Association ends of ExtRole::PowerSystemOrganisationRole with other 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.16.11 (NC) SecurityCoordinator

Inheritance path = SystemOperationCoordinator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

A role that coordinates the relevant remedial actions and their optimisation to ensure efficient use to achieve required operational security of the power system.

Table 365 shows all attributes of SecurityCoordinator.

Table 365 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 366 shows all association ends of SecurityCoordinator with other classes.

Table 366 – Association ends of ExtRole::SecurityCoordinator with other classes

mult from	name	mult to	type	description
0..1	CapacityCalculationRegion	0..*	CapacityCalculationRegion	(NC) The capacity calculation region operated by this security coordinator.
0..1	OutageCoordinationRegion	0..*	OutageCoordinationRegion	(NC) The outage coordination region that has this security coordinator.
0..1	RemedialActionSchedule	0..*	RemedialActionSchedule	(NC) Remedial action schedule for this security 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.16.12 (NC) SystemOperator

Inheritance path = PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

System operator.

Table 367 shows all attributes of SystemOperator.

Table 367 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 368 shows all association ends of SystemOperator with other classes.

Table 368 – Association ends of ExtRole::SystemOperator with other classes

mult from	name	mult to	type	description
0..1	MonitoringArea	0..*	MonitoringArea	(NC) The monitoring area that is operated by this system operator.
0..1	SchedulingArea	0..*	SchedulingArea	(NC) The scheduling area that is operated by this system operator.
1..1	OutcomeValue	0..*	OutcomeValue	(NC) Impact assessment outcome value for this impacted system operator.

mult from	name	mult to	type	description
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) Proposing remedial action schedule share which is made by the proposing entity.
0..1	RemedialAction	0..*	RemedialAction	(NC) Remedial action defined by this system operator.
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	AssessedElement	0..*	AssessedElement	(NC) All relevant network elements on which operational security violations need to be managed in a coordinated way.
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) Owner's assessment of the remedial action.
0..1	RemedialActionImpact	0..*	RemedialActionImpact	(NC) The remedial action impact for a given assessing System Operator.
0..1	RemedialActionScheduleAcceptance	0..*	RemedialActionScheduleAcceptance	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.16.13 (NC) SystemOperationCoordinator

Inheritance path = PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

A role that coordinates relevant information and impact in regards to operating the power system.

Table 369 shows all attributes of SystemOperationCoordinator.

Table 369 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 370 shows all association ends of SystemOperationCoordinator with other classes.

Table 370 – Association ends of ExtRole::SystemOperationCoordinator with other 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.16.14 (NC) TransmissionSystemOperator

Inheritance path = SystemOperator : PowerSystemOrganisationRole : OrganisationRole : IdentifiedObject : ExtEuIdentifiedObject : ExtOrganisationRole

A system operator role that is responsible for operating of an energy transmission network.

Table 371 shows all attributes of TransmissionSystemOperator.

Table 371 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject
globalLocationNumber	0..1	String	(NC) inherited from: ExtOrganisationRole

Table 372 shows all association ends of TransmissionSystemOperator with other classes.

Table 372 – Association ends of ExtRole::TransmissionSystemOperator with other classes

mult from	name	mult to	type	description
0..1	MonitoringArea	0..*	MonitoringArea	(NC) inherited from: SystemOperator
0..1	SchedulingArea	0..*	SchedulingArea	(NC) inherited from: SystemOperator
1..1	OutcomeValue	0..*	OutcomeValue	(NC) inherited from: SystemOperator
0..1	ProposingRemedialActionScheduleShare	0..*	ProposingRemedialActionScheduleShare	(NC) inherited from: SystemOperator
0..1	RemedialAction	0..*	RemedialAction	(NC) inherited from: SystemOperator
0..1	ControlArea	0..*	ControlArea	(NC) inherited from: SystemOperator
0..1	Contingency	0..*	Contingency	(NC) inherited from: SystemOperator
0..1	Fault	0..*	Fault	(NC) inherited from: SystemOperator
0..1	AssessedElement	0..*	AssessedElement	(NC) inherited from: SystemOperator
0..1	OwnerRemedialActionAssessment	0..*	OwnerRemedialActionAssessment	(NC) inherited from: SystemOperator

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

3.17 Security analysis result extensions

3.17.1 General

This package contains the extensions related to the security analysis result.

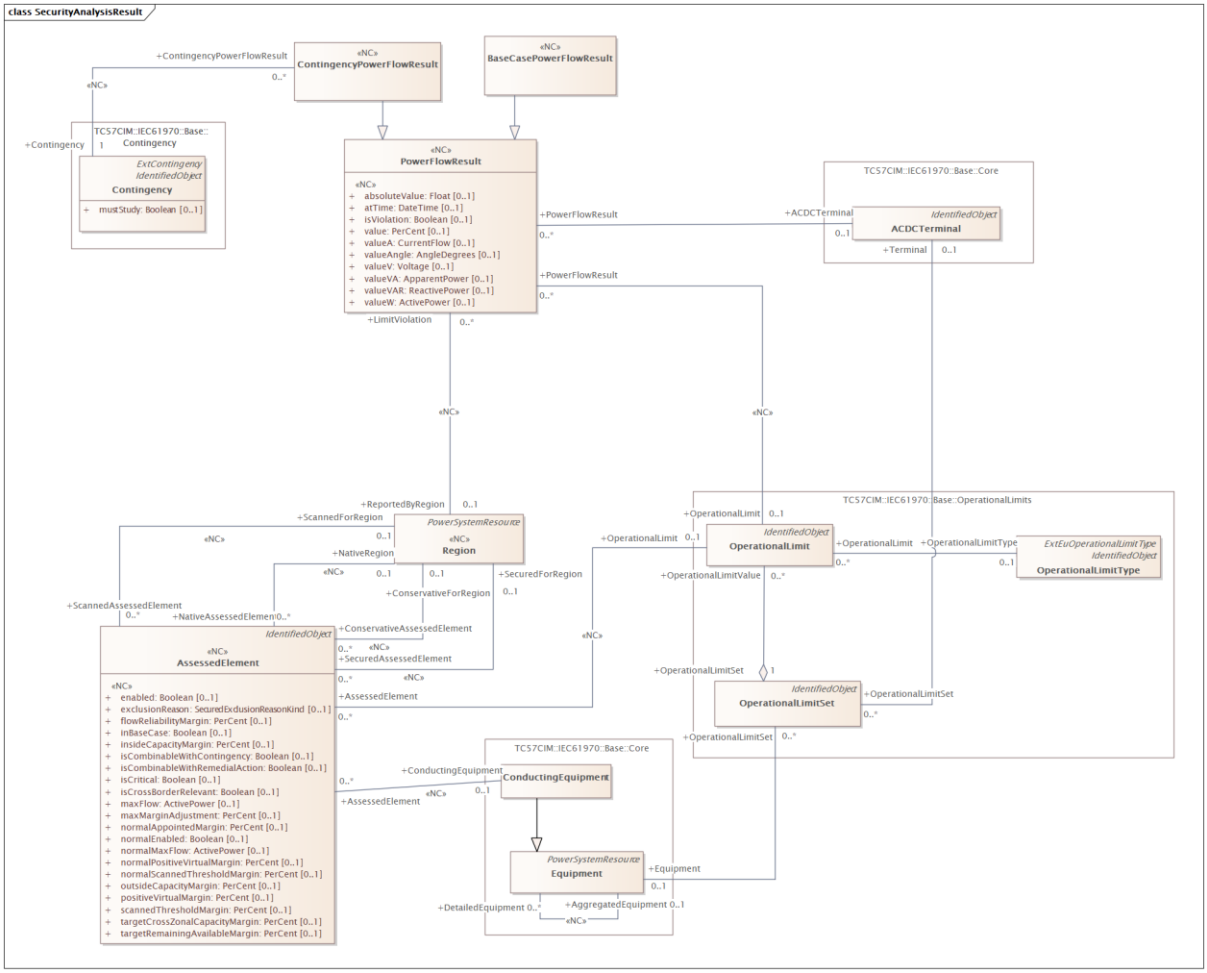

Figure 27 – Class diagram ExtSecurityAnalysisResult::SecurityAnalysisResult

Figure 27: The diagram contains classes related to the security analysis result.

3.17.2 (NC) BaseCasePowerFlowResult

Inheritance path = PowerFlowResult
Base case power flow result for a given terminal.
Table 373 shows all attributes of BaseCasePowerFlowResult.

Table 373 – Attributes of ExtSecurityAnalysisResult::BaseCasePowerFlowResult

name	mult	type	description
value	0..1	PerCent	(NC) inherited from: PowerFlowResult
absoluteValue	0..1	Float	(NC) inherited from: PowerFlowResult
atTime	0..1	DateTime	(NC) inherited from: PowerFlowResult
isViolation	0..1	Boolean	(NC) inherited from: PowerFlowResult
valueW	0..1	ActivePower	(NC) inherited from: PowerFlowResult
valueVA	0..1	ApparentPower	(NC) inherited from: PowerFlowResult
valueV	0..1	Voltage	(NC) inherited from: PowerFlowResult
valueAngle	0..1	AngleDegrees	(NC) inherited from: PowerFlowResult
valueA	0..1	CurrentFlow	(NC) inherited from: PowerFlowResult
valueVAR	0..1	ReactivePower	(NC) inherited from: PowerFlowResult

Table 374 shows all association ends of BaseCasePowerFlowResult with other classes.

Table 374 – Association ends of ExtSecurityAnalysisResult::BaseCasePowerFlowResult with other classes

mult from	name	mult to	type	description
0..*	OperationalLimit	0..1	OperationalLimit	(NC) inherited from: PowerFlowResult
0..*	ACDCTerminal	0..1	ACDCTerminal	inherited from: PowerFlowResult
0..*	ReportedByRegion	0..1	Region	(NC) inherited from: PowerFlowResult

3.17.3 (NC) ContingencyPowerFlowResult

Inheritance path = PowerFlowResult
Contingency power flow result on a given terminal for a given contingency.
Table 375 shows all attributes of ContingencyPowerFlowResult.

Table 375 – Attributes of ExtSecurityAnalysisResult::ContingencyPowerFlowResult

name	mult	type	description
value	0..1	PerCent	(NC) inherited from: PowerFlowResult
absoluteValue	0..1	Float	(NC) inherited from: PowerFlowResult
atTime	0..1	DateTime	(NC) inherited from: PowerFlowResult
isViolation	0..1	Boolean	(NC) inherited from: PowerFlowResult
valueW	0..1	ActivePower	(NC) inherited from: PowerFlowResult
valueVA	0..1	ApparentPower	(NC) inherited from: PowerFlowResult
valueV	0..1	Voltage	(NC) inherited from: PowerFlowResult
valueAngle	0..1	AngleDegrees	(NC) inherited from: PowerFlowResult
valueA	0..1	CurrentFlow	(NC) inherited from: PowerFlowResult
valueVAR	0..1	ReactivePower	(NC) inherited from: PowerFlowResult

Table 376 shows all association ends of ContingencyPowerFlowResult with other classes.

Table 376 – Association ends of ExtSecurityAnalysisResult::ContingencyPowerFlowResult with other classes

mult from	name	mult to	type	description
0..*	Contingency	1..1	Contingency	(NC) The contingency that has this power flow result.
0..*	OperationalLimit	0..1	OperationalLimit	(NC) inherited from: PowerFlowResult
0..*	ACDCTerminal	0..1	ACDCTerminal	inherited from: PowerFlowResult
0..*	ReportedByRegion	0..1	Region	(NC) inherited from: PowerFlowResult

3.17.4 (NC) PowerFlowResult root class

Power flow result including any operational limit violation.
Table 377 shows all attributes of PowerFlowResult.

Table 377 – 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.
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.
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.
valueVAR	0..1	ReactivePower	(NC) Reactive power value from a power flow calculation on a given terminal.

Table 378 shows all association ends of PowerFlowResult with other classes.

Table 378 – Association ends of ExtSecurityAnalysisResult::PowerFlowResult with other classes

mult from	name	mult to	type	description
0..*	OperationalLimit	0..1	OperationalLimit	(NC) The operational limit that has this limit violation.
0..*	ACDCTerminal	0..1	ACDCTerminal	ACDC terminal where the powerflow result is located.
0..*	ReportedByRegion	0..1	Region	(NC) The region which reports this limit violation.

3.18 Package ExtSecurityLimit

3.18.1 General

This package contains the extensions related to the security limits.

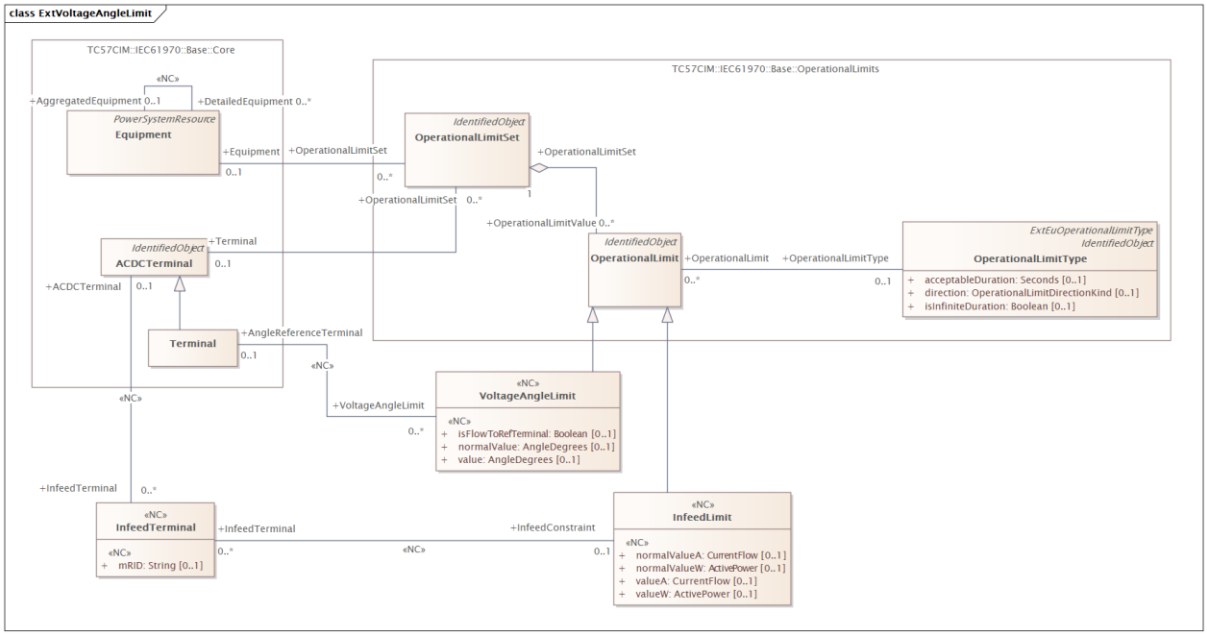

Figure 28 – Class diagram ExtSecurityLimit::ExtVoltageAngleLimit

Figure 28: The diagram contains classes related to voltage angle limit.

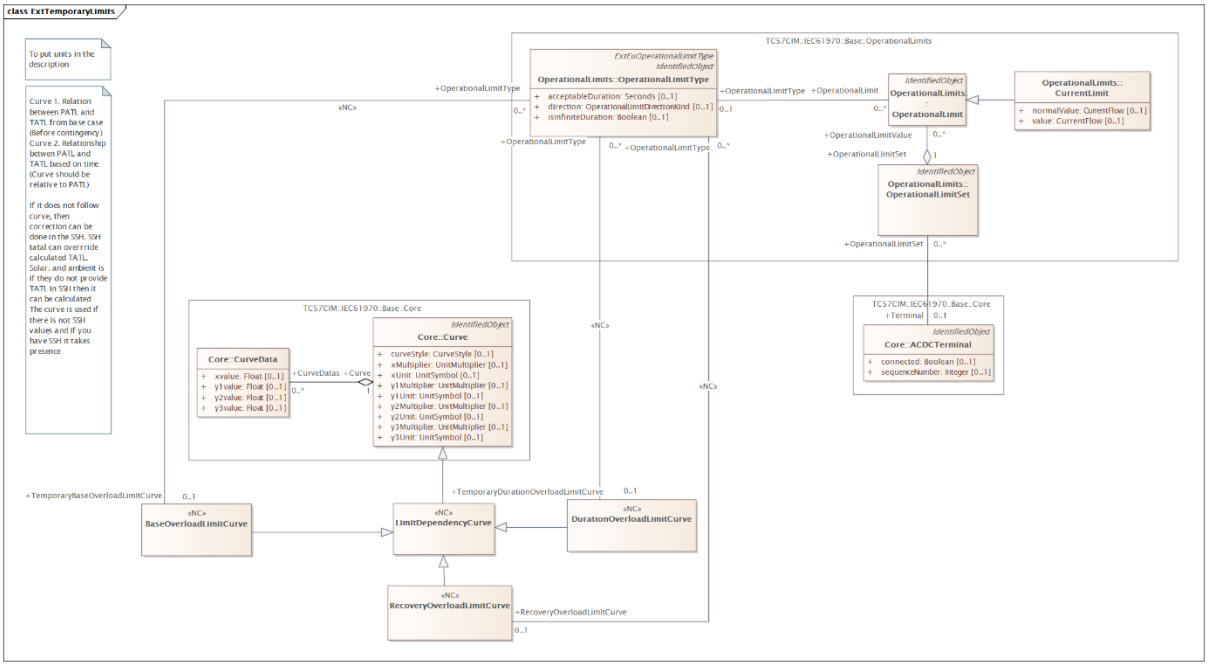

Figure 29 – Class diagram ExtSecurityLimit::ExtTemporaryLimits

Figure 29: The diagram contains classes related to temporary limits.

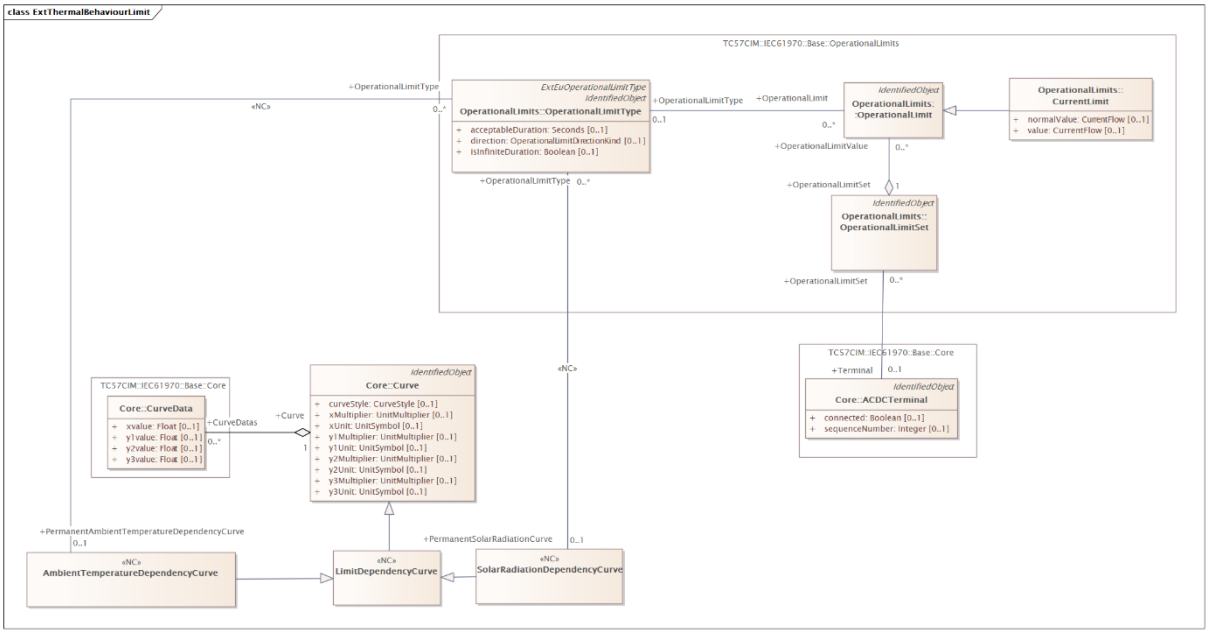

Figure 30 – Class diagram ExtSecurityLimit::ExtThermalBehaviourLimit

Figure 30: The diagram contains classes related to thermal behaviour limit.

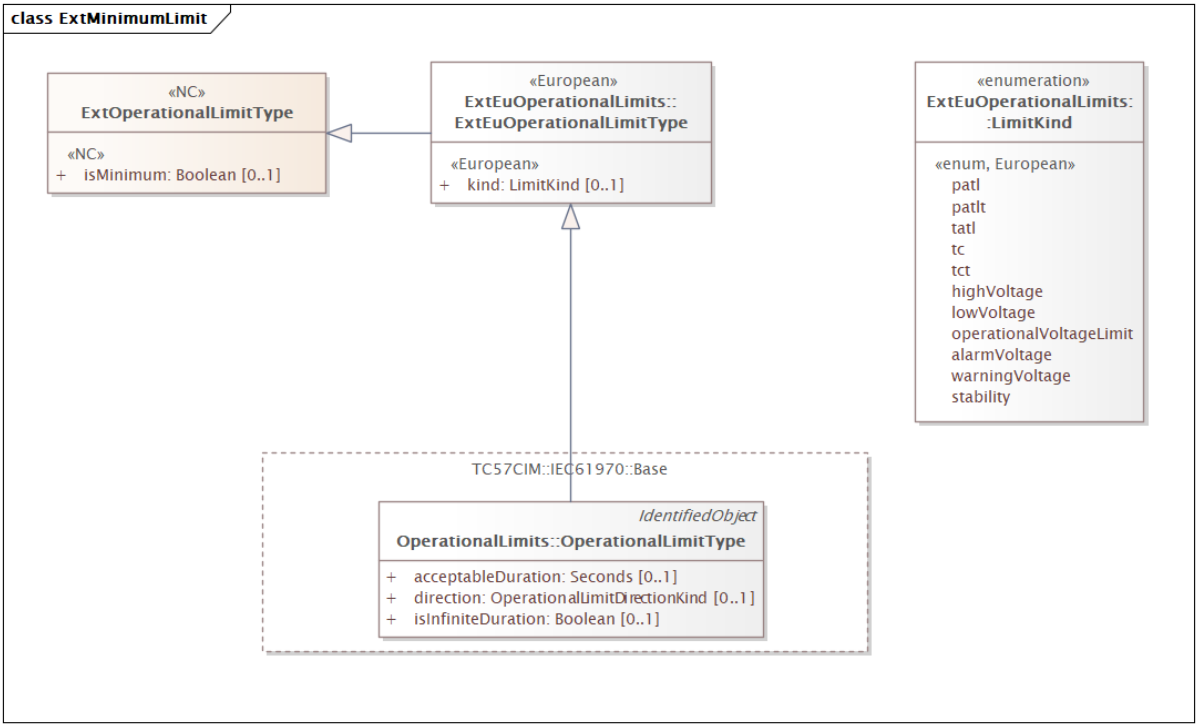

Figure 31 – Class diagram ExtSecurityLimit::ExtMinimumLimit

Figure 31: The diagram contains classes related to minimum limit.

3.18.2 (NC) AmbientTemperatureDependencyCurve

Inheritance path = LimitDependencyCurve : Curve : IdentifiedObject : ExtEuIdentifiedObject
A curve or functional relationship between the ambient temperature independent variable (X-axis) and relative temperature dependent (Y-axis) variables.
Table 379 shows all attributes of AmbientTemperatureDependencyCurve.

Table 379 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 380 shows all association ends of AmbientTemperatureDependencyCurve with other classes.

Table 380 – Association ends of ExtSecurityLimit::AmbientTemperatureDependencyCurve with other classes

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	CurveDatas	0..*	CurveData	inherited from: Curve
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.18.3 (NC) BaseOverloadLimitCurve

Inheritance path = LimitDependencyCurve : Curve : IdentifiedObject : ExtEuIdentifiedObject
A curve or functional relationship between
- the relative loading - current loading over permanent loading (PATL) independent variable (X-axis), and
- temporary overloading (TATL) limiting dependent (Y-axis) variables.

Table 381 shows all attributes of BaseOverloadLimitCurve.

Table 381 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 382 shows all association ends of BaseOverloadLimitCurve with other classes.

Table 382 – 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.18.4 (NC) DurationOverloadLimitCurve

Inheritance path = LimitDependencyCurve : Curve : IdentifiedObject : ExtEuIdentifiedObject
A curve or functional relationship between
- the overload duration independent variable (X-axis), and
- temporary overloading (TATL) limiting dependent (Y-axis) variables.
Table 383 shows all attributes of DurationOverloadLimitCurve.

Table 383 – 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
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 384 shows all association ends of DurationOverloadLimitCurve with other classes.

Table 384 – 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.18.5 (NC) LimitDependencyCurve

Inheritance path = Curve : IdentifiedObject : ExtEuIdentifiedObject

A curve or functional relationship between an independent variable (X-axis) and limiting dependent (Y-axis) variables.

Table 385 shows all attributes of LimitDependencyCurve.

Table 385 – 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
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 386 shows all association ends of LimitDependencyCurve with other classes.

Table 386 – Association ends of ExtSecurityLimit::LimitDependencyCurve with other classes

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

3.18.6 (NC) RecoveryOverloadLimitCurve

Inheritance path = LimitDependencyCurve : Curve : IdentifiedObject : ExtEuIdentifiedObject
The relation between the recovery time and an overload limit.
Table 387 shows all attributes of RecoveryOverloadLimitCurve.

Table 387 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 388 shows all association ends of RecoveryOverloadLimitCurve with other classes.

Table 388 – Association ends of ExtSecurityLimit::RecoveryOverloadLimitCurve with other classes

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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.18.7 (NC) SolarRadiationDependencyCurve

Inheritance path = LimitDependencyCurve : Curve : IdentifiedObject : ExtEuIdentifiedObject
A curve or functional relationship between
- the solar radiation independent variable (X-axis), and
- relative dependent (Y-axis) variables.
Table 389 shows all attributes of SolarRadiationDependencyCurve.

Table 389 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 390 shows all association ends of SolarRadiationDependencyCurve with other classes.

Table 390 – Association ends of ExtSecurityLimit::SolarRadiationDependencyCurve 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.18.8 (NC) VoltageAngleLimit

Inheritance path = OperationalLimit : IdentifiedObject : ExtEuIdentifiedObject
Voltage angle limit between two terminals. The association end OperationalLimitSet.Terminal defines one end and the host of the limit. The association end VoltageAngleLimit.AngleReferenceTerminal defines the reference terminal.
Table 391 shows all attributes of VoltageAngleLimit.

3485 **Table 391 – Attributes of ExtSecurityLimit::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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

3486

3487 Table 392 shows all association ends of VoltageAngleLimit with other classes.

3488 **Table 392 – Association ends of ExtSecurityLimit::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..*	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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3489

3490 ### 3.18.9 (NC) ExtOperationalLimitType root class

3491 European network codes extension to base CIM counterpart.

3492 Table 393 shows all attributes of ExtOperationalLimitType.

3493 **Table 393 – 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

name	mult	type	description
			behaviour. OperationalLimitType.direction attribute shall be absoluteValue.

3.18.10 (NC) InfeedLimit

Inheritance path = OperationalLimit : IdentifiedObject : ExtEuIdentifiedObject
Infeed limit set constraints fed in to the network by two or more terminals.
Table 394 shows all attributes of InfeedLimit.

Table 394 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 395 shows all association ends of InfeedLimit with other classes.

Table 395 – Association ends of ExtSecurityLimit::InfeedLimit with other classes

mult from	name	mult to	type	description
0..1	InfeedTerminal	0..*	InfeedTerminal	(NC) Infeed terminal that has infeed constraints.
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.18.11 (NC) InfeedTerminal root class

Infeed terminal defines the terminals that are linked to an infeed limit.
Table 396 shows all attributes of InfeedTerminal.

3507 **Table 396 – 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.

3508
3509 Table 397 shows all association ends of InfeedTerminal with other classes.

3510 **Table 397 – Association ends of ExtSecurityLimit::InfeedTerminal with other classes**

mult from	name	mult to	type	description
0..*	InfeedConstraint	0..1	InfeedLimit	(NC) Infeed constraint which belongs to an infeed terminal.
0..*	ACDCTerminal	0..1	ACDCTerminal	(NC) ACDCTerminal which is connected to an infeed terminal.

3511

3512 3.19 Package ExtSensitivityMatrix

3513 3.19.1 General

3514 This package contains extensions related to sensitivity matrix.

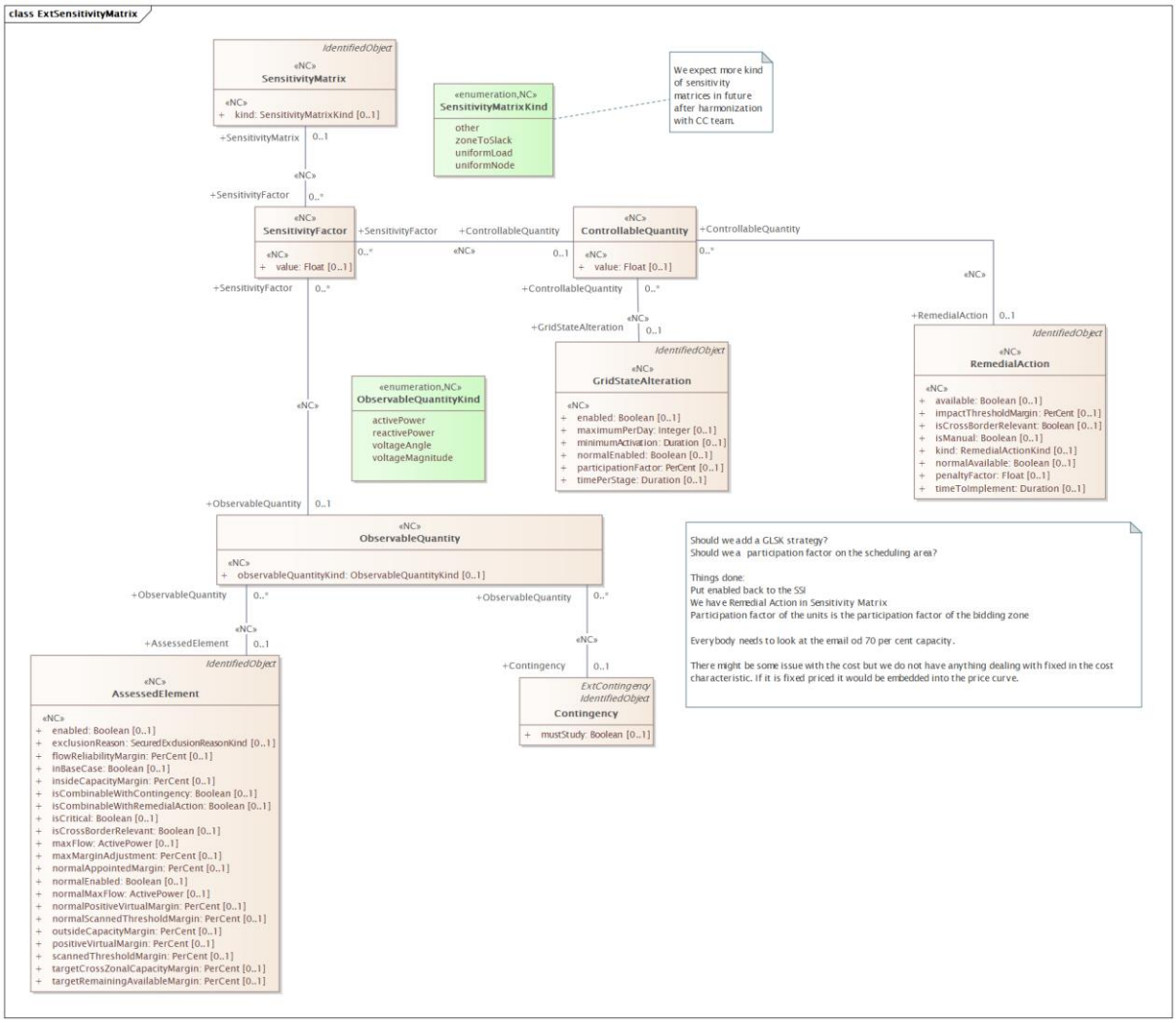

Figure 32 – Class diagram ExtSensitivityMatrix::ExtSensitivityMatrix

Figure 32: The diagram contains classes related to sensitivity matrix.

3.19.2 (NC) ControllableQuantity root class

Controllable quantity is a set point quantity on a grid state alteration or on a remedial action. Table 398 shows all attributes of ControllableQuantity.

Table 398 – 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 sensitivity factor. The value can be integer, float or boolean. In case of boolean 1 equals true and 0 equals false.

Table 399 shows all association ends of ControllableQuantity with other classes.

Table 399 – Association ends of ExtSensitivityMatrix::ControllableQuantity with other classes

mult from	name	mult to	type	description
0..*	GridStateAlteration	0..1	GridStateAlteration	(NC) The grid state alteration for this controllable quantity.
0..*	RemedialAction	0..1	RemedialAction	(NC) Remedial action which is associated with the controllable quantity.
0..1	SensitivityFactor	0..*	SensitivityFactor	(NC) The sensitivity factor associated with a controllable quantity.

3.19.3 (NC) ObservableQuantity root class

Observable quantity is an electrical quantity on an assessed element or an assessed element with contingency.
Table 400 shows all attributes of ObservableQuantity.

Table 400 – Attributes of ExtSensitivityMatrix::ObservableQuantity

name	mult	type	description
observableQuantityKind	0..1	ObservableQuantityKind	(NC) Kind of observable quantity.

Table 401 shows all association ends of ObservableQuantity with other classes.

Table 401 – Association ends of ExtSensitivityMatrix::ObservableQuantity with other classes

mult from	name	mult to	type	description
0..*	AssessedElement	0..1	AssessedElement	(NC) The assessed element with contingency associated with this observable quantity.
0..*	Contingency	0..1	Contingency	(NC) The contingency associated with this observable quantity.
0..1	SensitivityFactor	0..*	SensitivityFactor	(NC) The sensitivity factor associated with an observable quantity.

3.19.4 (NC) SensitivityFactor root class

The sensitivity factor which represents the sensitivity between observable and controllable elements.
Table 402 shows all attributes of SensitivityFactor.

Table 402 – Attributes of ExtSensitivityMatrix::SensitivityFactor

name	mult	type	description
value	0..1	Float	(NC) The value of the sensitivity factor.

Table 403 shows all association ends of SensitivityFactor with other classes.

Table 403 – Association ends of ExtSensitivityMatrix::SensitivityFactor with other classes

mult from	name	mult to	type	description
0..*	ControllableQuantity	0..1	ControllableQuantity	(NC) The controllable quantity for this sensitivity factor.
0..*	ObservableQuantity	0..1	ObservableQuantity	(NC) The observable quantity for this sensitivity factor.
0..*	SensitivityMatrix	0..1	SensitivityMatrix	(NC) The sensitivity matrix which contains this sensitivity factor.

3.19.5 (NC) SensitivityMatrix

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

The sensitivity matrix which represents the sensitivity factors between observable and controllable elements.

Table 404 shows all attributes of SensitivityMatrix.

Table 404 – Attributes of ExtSensitivityMatrix::SensitivityMatrix

name	mult	type	description
kind	0..1	SensitivityMatrixKind	(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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 405 shows all association ends of SensitivityMatrix with other classes.

Table 405 – Association ends of ExtSensitivityMatrix::SensitivityMatrix with other classes

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

3.19.6 (NC) ObservableQuantityKind enumeration

Kind of observable quantity.

Table 406 shows all literals of ObservableQuantityKind.

Table 406 – Literals of ExtSensitivityMatrix::ObservableQuantityKind

literal	value	description
activePower		The observable quantity is the active power.
reactivePower		The observable quantity is the reactive power.
voltageAngle		The observable quantity is the angle of terminal voltage.
voltageMagnitude		The observable quantity is the magnitude of terminal voltage.

3.19.7 (NC) SensitivityMatrixKind enumeration

Kinds of sensitivity matrix.

Table 407 shows all literals of SensitivityMatrixKind.

Table 407 – Literals of ExtSensitivityMatrix::SensitivityMatrixKind

literal	value	description
zoneToSlack		Zone to slack kind of sensitivity matrix.
other		Other kind of sensitivity matrix.
uniformLoad		Uniform load matrix.
uniformNode		Uniform node matrix.

3.20 Package ExtSchedule

3.20.1 General

This package contains the extensions related to the schedule.

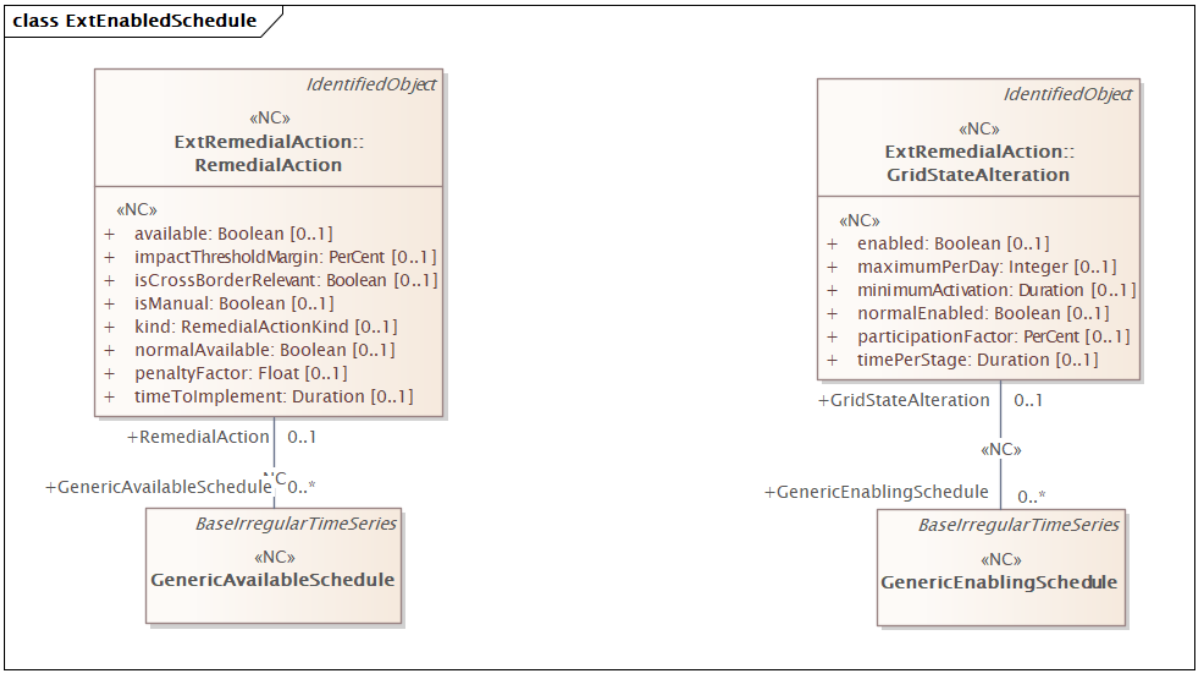

Figure 33 – Class diagram ExtSchedule::ExtEnabledSchedule

Figure 33: The diagram contains classes related to enabled schedule.

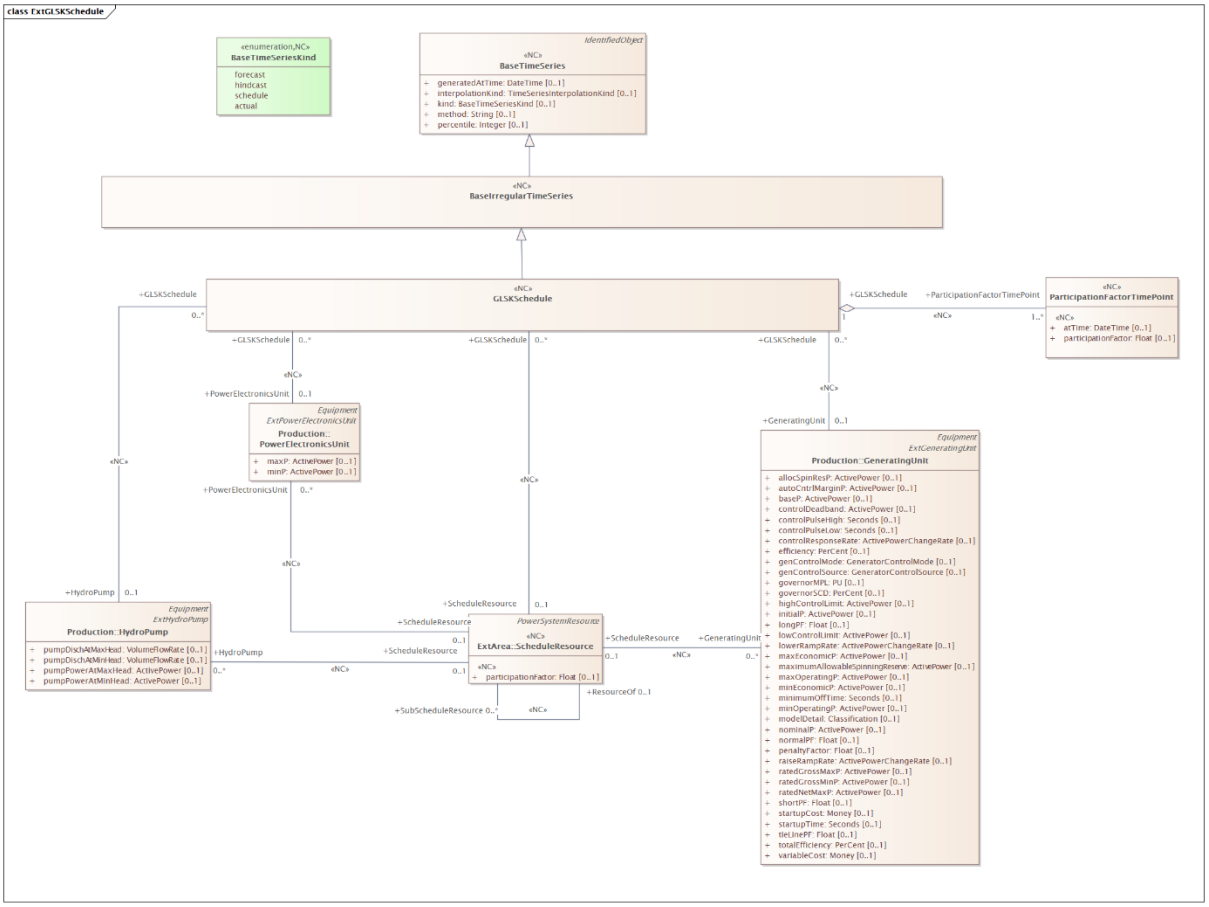

Figure 34 – Class diagram ExtSchedule::ExtGLSKSchedule

Figure 34: The diagram contains classes related to GLSK schedule.

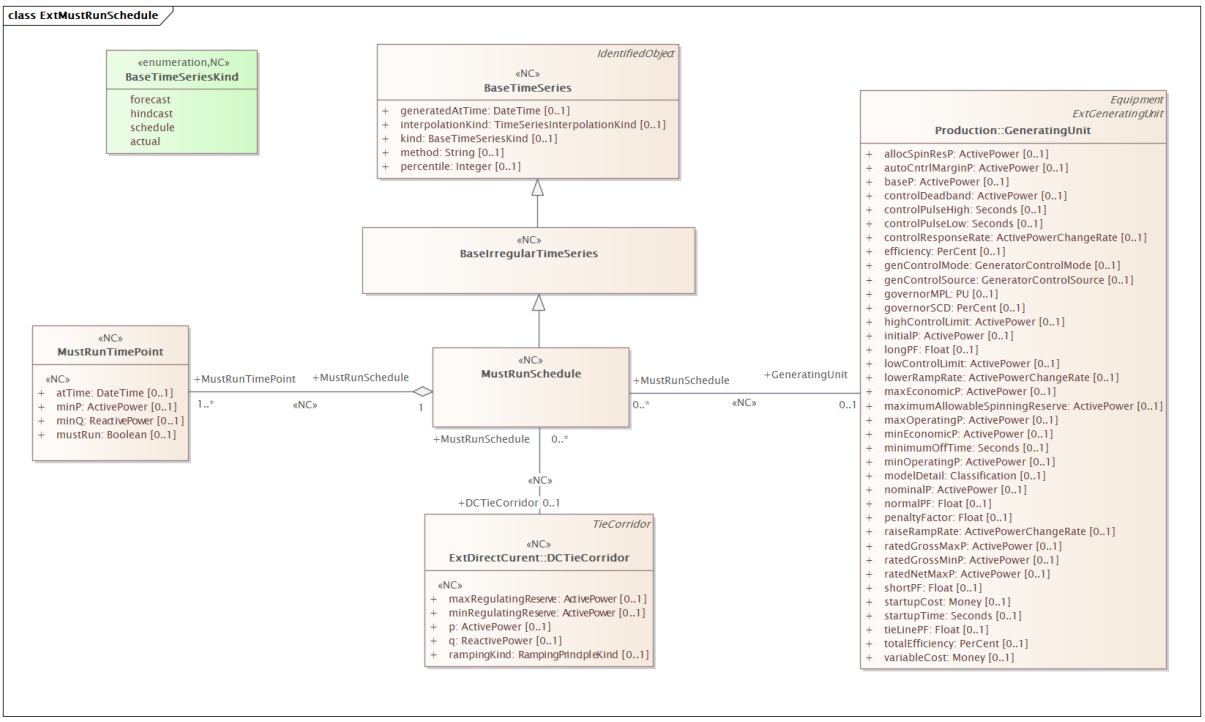

Figure 35 – Class diagram ExtSchedule::ExtMustRunSchedule

Figure 35: The diagram contains classes related to must run schedule.

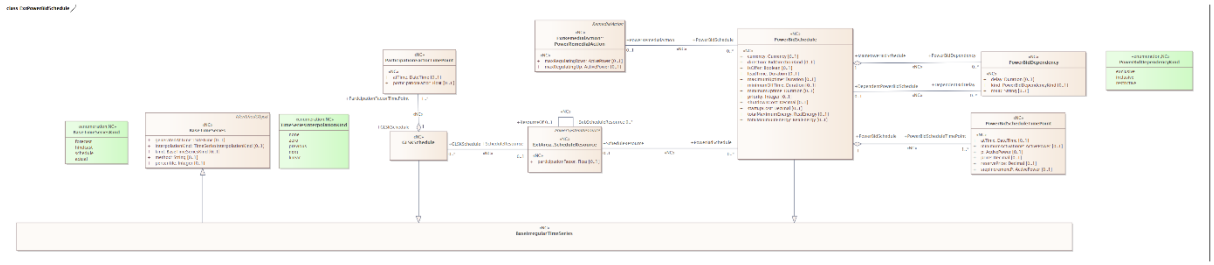

Figure 36 – Class diagram ExtSchedule::ExtPowerBidSchedule

Figure 36: The diagram contains classes related to power bid schedule.

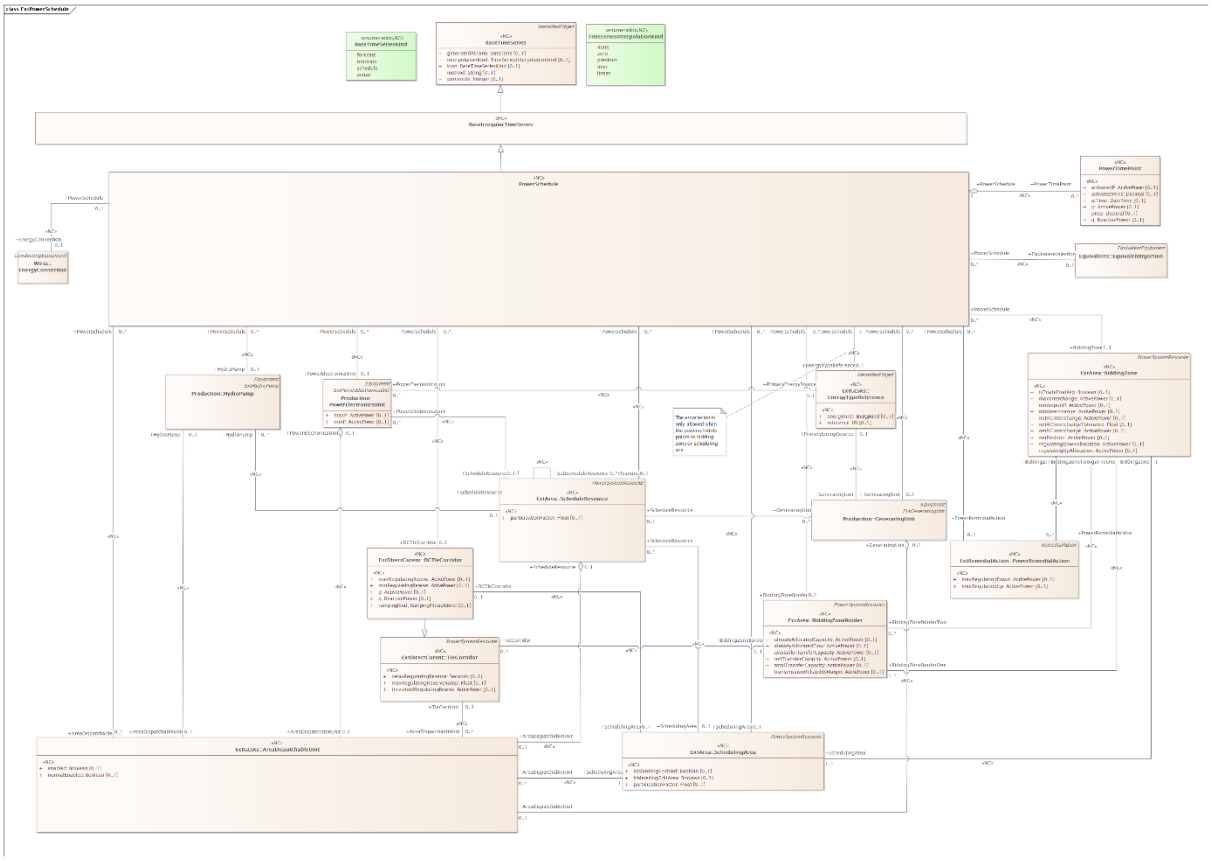

Figure 37 – Class diagram ExtSchedule::ExtPowerSchedule

Figure 37: The diagram contains classes related to schedule.

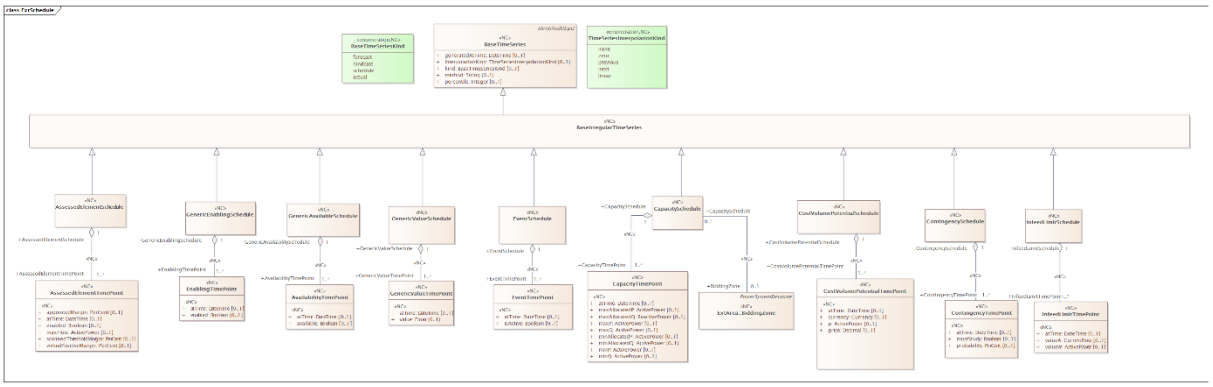

Figure 38 – Class diagram ExtSchedule::ExtSchedule

Figure 38: The diagram contains classes related to schedule.

3.20.2 (NC) GLSKSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for Generation and Load Shift Keys (GLSK).

Table 408 shows all attributes of GLSKSchedule.

Table 408 – Attributes of ExtSchedule::GLSKSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

Table 409 shows all association ends of GLSKSchedule with other classes.

Table 409 – Association ends of ExtSchedule::GLSKSchedule with other classes

mult from	name	mult to	type	description
0..*	ScheduleResource	0..1	ScheduleResource	(NC) The Schedule Resource that has a GLSK schedule.
0..*	EnergyBlockOrder	0..1	EnergyBlockOrder	(NC) A EnergyBlockOrder which has a GLSK Schedule.
0..*	EnergyGroup	0..1	EnergyGroup	(NC) The EnergyGroup which has a GLSK Schedule.
0..*	EnergyConsumer	0..1	EnergyConsumer	(NC) The EnergyConsumer that has a GLSK schedule.
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) The Power Electronics Unit which has a GLSK schedule.
0..*	HydroPump	0..1	HydroPump	(NC) The Hydro Pump which has a GLSK schedule.
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) The Generating Unit which a GLSK Schedule.
0..1	GLSKBidActionDistribution	0..1	GLSKBidActionDistribution	(NC) GLSK bid action distribution for the GLSK schedule.
1..1	ParticipationFactorTimePoint	1..*	ParticipationFactorTimePoint	(NC) The participation factor timepoint for a GLSK schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.3 (NC) BaseIrregularTimeSeries

Inheritance path = BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Time series that has irregular points in time.
Table 410 shows all attributes of BaseIrregularTimeSeries.

Table 410 – Attributes of ExtSchedule::BaseIrregularTimeSeries

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

Table 411 shows all association ends of BaseIrregularTimeSeries with other classes.

Table 411 – Association ends of ExtSchedule::BaseIrregularTimeSeries 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.4 (NC) BaseTimeSeries

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

Time series of values at points in time.

Table 412 shows all attributes of BaseTimeSeries.

Table 412 – Attributes of ExtSchedule::BaseTimeSeries

name	mult	type	description
generatedAtTime	0..1	DateTime	The time this time series (entity) come to existents and available for use.
interpolationKind	0..1	TimeSeriesInterpolationKind	Kind of interpolation done between time point.
kind	0..1	BaseTimeSeriesKind	Kind of base time series.
method	0..1	String	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.
percentile	0..1	Integer	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

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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 413 shows all association ends of BaseTimeSeries with other classes.

Table 413 – 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.5 (NC) EventSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Time series represent irregular event described by event points in time.

Table 414 shows all attributes of EventSchedule.

Table 414 – Attributes of ExtSchedule::EventSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

Table 415 shows all association ends of EventSchedule with other classes.

Table 415 – Association ends of ExtSchedule::EventSchedule with other classes

mult from	name	mult to	type	description
0..1	ActualAvailabilitySchedule	0..1	AvailabilitySchedule	(NC) Actual availability schedule that has this irregular interval schedule.

mult from	name	mult to	type	description
0..1	PlannedAvailabilitySchedule	0..1	AvailabilitySchedule	(NC) Planned availability schedule that has this irregular interval schedule.
0..1	RemedialActionSchedule	0..1	RemedialActionSchedule	Remedial action schedule is the event that is validity for the given time series.
1..1	EventTimePoint	1..*	EventTimePoint	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.6 (NC) EventTimePoint root class

Event valid for a given point in time.
Table 416 shows all attributes of EventTimePoint.

Table 416 – 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.

Table 417 shows all association ends of EventTimePoint with other classes.

Table 417 – Association ends of ExtSchedule::EventTimePoint with other classes

mult from	name	mult to	type	description
1..*	EventSchedule	1..1	EventSchedule	(NC) Time series the time point values belongs to.

3.20.7 (NC) GenericValueSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Time series represent irregular generic value at given points in time. The type of value is given by the reference association.
Table 418 shows all attributes of GenericValueSchedule.

Table 418 – Attributes of ExtSchedule::GenericValueSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 419 shows all association ends of GenericValueSchedule with other classes.

Table 419 – Association ends of ExtSchedule::GenericValueSchedule with other classes

mult from	name	mult to	type	description
0..*	PowerRemedialAction	0..1	PowerRemedialAction	(NC) Power remedial action for the generic value schedule.
0..*	RemedialActionSchedule	0..1	RemedialActionSchedule	(NC) Remedial action schedule which has generic value schedules.
0..*	RangeConstraint	0..1	RangeConstraint	(NC) Range constraint for the generic value schedule.
1..1	GenericValueTimePoint	1..*	GenericValueTimePoint	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.8 (NC) GenericValueTimePoint root class

Generic value for a given point in time.
Table 420 shows all attributes of GenericValueTimePoint.

Table 420 – 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.

Table 421 shows all association ends of GenericValueTimePoint with other classes.

Table 421 – Association ends of ExtSchedule::GenericValueTimePoint with other classes

mult from	name	mult to	type	description
1..*	GenericValueSchedule	1..1	GenericValueSchedule	(NC) Time series the time point values belongs to.

3.20.9 (NC) MustRunSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Time series represent irregular must-run instruction values at given points in time. This could be instruction to a reliability must-run (RMR) generation facility that is necessary to run to meet certain operating conditions in order to maintain the security of power systems in a competitive environment.
Table 422 shows all attributes of MustRunSchedule.

Table 422 – Attributes of ExtSchedule::MustRunSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

Table 423 shows all association ends of MustRunSchedule with other classes.

Table 423 – 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	DCTieCorridor	(NC) Hydro pump which belongs to the power schedule.
1..1	MustRunTimePoint	1..*	MustRunTimePoint	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.10 (NC) MustRunTimePoint root class

Must-run instruction value at a given point in time.
Table 424 shows all attributes of MustRunTimePoint.

Table 424 – Attributes of ExtSchedule::MustRunTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
minP	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

name	mult	type	description
			operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
minQ	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.

Table 425 shows all association ends of MustRunTimePoint with other classes.

Table 425 – Association ends of ExtSchedule::MustRunTimePoint with other classes

mult from	name	mult to	type	description
1..*	MustRunSchedule	1..1	MustRunSchedule	(NC) Time series the time point values belongs to.

3.20.11 (NC) PowerSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

Time series represent irregular power, active and reactive, values at given points in time.

Table 426 shows all attributes of PowerSchedule.

Table 426 – Attributes of ExtSchedule::PowerSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

Table 427 shows all association ends of PowerSchedule with other classes.

Table 427 – Association ends of ExtSchedule::PowerSchedule with other classes

mult from	name	mult to	type	description
0..1	PowerRemedialAction	0..1	PowerRemedialAction	(NC) Power remedial action which belongs to the Remedial Action Schedule.
0..*	EnergyConnection	0..1	EnergyConnection	(NC) The energy connection that has a power schedule.

mult from	name	mult to	type	description
0..*	GeneratingUnit	0..1	GeneratingUnit	(NC) Generating unit which belongs to the power schedule.
0..*	PowerElectronicsUnit	0..1	PowerElectronicsUnit	(NC) Power electronics unit which belongs to the power schedule.
0..*	HydroPump	0..1	HydroPump	(NC) Hydro pump which belongs to the power schedule.
0..*	BiddingZone	0..1	BiddingZone	(NC) Bidding zone which has powerschedules.
0..*	BiddingZoneBorder	0..1	BiddingZoneBorder	(NC) Bidding zone border which belongs to the power schedule.
0..*	ScheduleResource	0..1	ScheduleResource	(NC) Schedule resource which has power schedules.
0..*	SchedulingArea	0..1	SchedulingArea	Scheduling area which has power schedules.
0..*	DCTieCorridor	0..1	DCTieCorridor	(NC) DC tie corridor which belongs to the power schedule.
0..*	AreaDispatchableUnit	0..1	AreaDispatchableUnit	(NC) Area disptachable unit which belongs to the power schedule.
0..*	EnergyTypeReference	0..1	EnergyTypeReference	(NC) Energy type reference which belongs to the power bidding zone.
0..1	PowerScheduleAction	0..1	PowerScheduleAction	(NC) Power schedule action which belongs to the power schedule.
1..1	PowerTimePoint	0..*	PowerTimePoint	(NC) Value for the point in time.
0..*	EquivalentInjection	0..1	EquivalentInjection	(NC) Equivalent injection which belongs to the power schedule.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.12 (NC) PowerTimePoint root class

Power, active and reactive, value at a given point in time.
Table 428 shows all attributes of PowerTimePoint.

Table 428 – 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

name	mult	type	description
			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.

Table 429 shows all association ends of PowerTimePoint with other classes.

Table 429 – Association ends of ExtSchedule::PowerTimePoint with other classes

mult from	name	mult to	type	description
0..*	PowerSchedule	1..1	PowerSchedule	(NC) Time series the time point values belongs to.

3.20.13 (NC) BaseTimeSeriesKind enumeration

Kind of time series.
Table 430 shows all literals of BaseTimeSeriesKind.

Table 430 – 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.
actual		Time series is actual data. The values represent measured or calculated values that represent the actual behaviour.

3.20.14 (NC) TimeSeriesInterpolationKind enumeration

Kinds of interpolation of values between two time point.
Table 431 shows all literals of TimeSeriesInterpolationKind.

Table 431 – 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.

3.20.15 (NC) AssessedElementSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for Assessed Element.

Table 432 shows all attributes of AssessedElementSchedule.

Table 432 – Attributes of ExtSchedule::AssessedElementSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

Table 433 shows all association ends of AssessedElementSchedule with other classes.

Table 433 – Association ends of ExtSchedule::AssessedElementSchedule with other classes

mult from	name	mult to	type	description
0..*	AssessedElement	0..1	AssessedElement	(NC) Assessed element which has an assessed element schedule.
1..1	AssessedElementTimePoint	1..*	AssessedElementTimePoint	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.16 (NC) ParticipationFactorTimePoint root class

Participation factor for a given point in time.

Table 434 shows all attributes of ParticipationFactorTimePoint.

Table 434 – 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

name	mult	type	description
			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/sum(PF). In the case of priority strategy, the item with the lowest number gets allocated energy first.

Table 435 shows all association ends of ParticipationFactorTimePoint with other classes.

Table 435 – Association ends of ExtSchedule::ParticipationFactorTimePoint with other classes

mult from	name	mult to	type	description
1..*	GLSKSchedule	1..1	GLSKSchedule	(NC) The GLSK schedule which belongs to the participation factor timepoint.

3.20.17 (NC) CapacitySchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for the capacity.

Table 436 shows all attributes of CapacitySchedule.

Table 436 – Attributes of ExtSchedule::CapacitySchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

Table 437 shows all association ends of CapacitySchedule with other classes.

Table 437 – Association ends of ExtSchedule::CapacitySchedule with other classes

mult from	name	mult to	type	description
0..*	BiddingZone	0..1	BiddingZone	(NC) Bidding zone which is referred by the capacity schedule.
1..1	CapacityTimePoint	1..*	CapacityTimePoint	(NC) The capacity timepoint for a capacity schedule.
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.18 (NC) CapacityTimePoint root class

Capacity instruction value at a given point in time.
Table 438 shows all attributes of CapacityTimePoint.

Table 438 – 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.
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.

Table 439 shows all association ends of CapacityTimePoint with other classes.

Table 439 – Association ends of ExtSchedule::CapacityTimePoint with other classes

mult from	name	mult to	type	description
1..*	CapacitySchedule	1..1	CapacitySchedule	(NC) The capacity schedule which belongs to the capacity timepoint.

3.20.19 (NC) CostVolumePotentialSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
The schedule for the cost volume potential.
Table 440 shows all attributes of CostVolumePotentialSchedule.

3748 **Table 440 – Attributes of ExtSchedule::CostVolumePotentialSchedule**

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

3749
3750 Table 441 shows all association ends of CostVolumePotentialSchedule with other classes.

3751 **Table 441 – Association ends of ExtSchedule::CostVolumePotentialSchedule with other**
3752 **classes**

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

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3754 ### 3.20.20 (NC) CostVolumePotentialTimePoint root class

3755 Cost volume potential value at a given point in time.
3756 Table 442 shows all attributes of CostVolumePotentialTimePoint.

3757 **Table 442 – 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.

3758
3759 Table 443 shows all association ends of CostVolumePotentialTimePoint with other classes.

Table 443 – Association ends of ExtSchedule::CostVolumePotentialTimePoint with other classes

mult from	name	mult to	type	description
1..*	CostVolumePotentialSchedule	1..1	CostVolumePotentialSchedule	(NC) The cost volume potential schedule that has this time point.

3.20.21 (NC) ContingencySchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for Contingency.

Table 444 shows all attributes of ContingencySchedule.

Table 444 – Attributes of ExtSchedule::ContingencySchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

Table 445 shows all association ends of ContingencySchedule with other classes.

Table 445 – 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..*	ContingencyTimePoint	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.22 (NC) ContingencyTimePoint root class

Contingency instruction value at a given point in time.

Table 446 shows all attributes of ContingencyTimePoint.

Table 446 – 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.

Table 447 shows all association ends of ContingencyTimePoint with other classes.

Table 447 – Association ends of ExtSchedule::ContingencyTimePoint with other classes

mult from	name	mult to	type	description
1..*	ContingencySchedule	1..1	ContingencySchedule	(NC) The contingency schedule that has this time point.

3.20.23 (NC) AssessedElementTimePoint root class

Assessed element instruction value at a given point in time.
Table 448 shows all attributes of AssessedElementTimePoint.

Table 448 – Attributes of ExtSchedule::AssessedElementTimePoint

name	mult	type	description
atTime	0..1	DateTime	(NC) The time the data is valid for.
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,

name	mult	type	description
			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].

Table 449 shows all association ends of AssessedElementTimePoint with other classes.

Table 449 – Association ends of ExtSchedule::AssessedElementTimePoint with other classes

mult from	name	mult to	type	description
1..*	AssessedElementSchedule	1..1	AssessedElementSchedule	(NC) The assessed element schedule that has this time point.

3.20.24 (NC) PowerBidScheduleTimePoint root class

Time series represent irregular power, active and reactive, values at given points in time.
Table 450 shows all attributes of PowerBidScheduleTimePoint.

Table 450 – 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.

Table 451 shows all association ends of PowerBidScheduleTimePoint with other classes.

Table 451 – Association ends of ExtSchedule::PowerBidScheduleTimePoint with other classes

mult from	name	mult to	type	description
1..*	PowerBidSchedule	1..1	PowerBidSchedule	(NC) Power bid schedule that has many power bid schedule time points.

3.20.25 (NC) PowerBidSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
Power bid or offer related to a redispatch or countertrading measures. In the case of market place for economic efficiency of the bids and offers, this is equivalent to BidTimeSeries class in 62325 package.
Table 452 shows all attributes of PowerBidSchedule.

3806 **Table 452 – Attributes of ExtSchedule::PowerBidSchedule**

name	mult	type	description
isOffer	0..1	Boolean	(NC) Indicates if the energy bid is an offer or not. True, means that the bid is an offer. False, means that the bid is not an offer.
totalMaximumEnergy	0..1	RealEnergy	(NC) Maximum total energy that can be activated by the bid.
direction	0..1	BidDirectionKind	(NC) Define the direction of the energy adjustment.
currency	0..1	Currency	(NC) Currency of the bid.
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.
startupCost	0..1	Decimal	(NC) Total startup cost incurred for all the units involved in the bid. This overrides any cost on the specific unit.
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.
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.
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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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3808 Table 453 shows all association ends of PowerBidSchedule with other classes.

3809 **Table 453 – Association ends of ExtSchedule::PowerBidSchedule with other classes**

mult from	name	mult to	type	description
0..*	ScheduleResource	0..1	ScheduleResource	(NC) Schedule resource which has several power bid schedules.

mult from	name	mult to	type	description
0..*	PowerRemedialAction	0..1	PowerRemedialAction	(NC) Power remedial action for which the bid is given.
0..1	GLSKBidActionDistribution	0..*	GLSKBidActionDistribution	(NC) Distribution of the power bid amongst the generators and loads.
0..1	PowerSchedulelAction	0..1	PowerScheduleAction	(NC) The power schedule action pointed by the power bid schedule.
1..1	PowerBidScheduleTimePoint	1..*	PowerBidScheduleTimePoint	(NC) Power bid schedule time points which belong to a power bid schedule.
1..1	PowerBidDependency	0..*	PowerBidDependency	(NC) Power bids which depends on main bid.
0..1	DependentBidDelay	0..*	PowerBidDependency	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.26 (NC) PowerBidDependency root class

Dependency between the related power bids.
Table 454 shows all attributes of PowerBidDependency.

Table 454 – Attributes of ExtSchedule::PowerBidDependency

name	mult	type	description
kind	0..1	PowerBidDependencyKind	(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 or rdf:about attributes that identify CIM object elements.

Table 455 shows all association ends of PowerBidDependency with other classes.

Table 455 – Association ends of ExtSchedule::PowerBidDependency with other classes

mult from	name	mult to	type	description
0..*	MainPowerBidSchedule	1..1	PowerBidSchedule	(NC) Main power bid which some dependent power bids.
0..*	DependentPowerBidSchedule	0..1	PowerBidSchedule	(NC) Dependent power bid which has some dependent bid delays.

3.20.27 (NC) GenericEnablingSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for the enabling of elements.

Table 456 shows all attributes of GenericEnablingSchedule.

Table 456 – Attributes of ExtSchedule::GenericEnablingSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

Table 457 shows all association ends of GenericEnablingSchedule with other classes.

Table 457 – Association ends of ExtSchedule::GenericEnablingSchedule with other classes

mult from	name	mult to	type	description
0..*	ContingencyWithRemedialAction	0..1	ContingencyWithRemedialAction	(NC) Contingency with remedial action which has enabling schedules.
0..*	AssessedElementWithContingency	0..1	AssessedElementWithContingency	(NC) Assessed element with contingency that has enabling schedules.
0..*	AssessedElementWithRemedialAction	0..1	AssessedElementWithRemedialAction	(NC) Assessed element with remedial action that has enabling schedules.
0..*	GridStateAlteration	0..1	GridStateAlteration	(NC) Grid state alteration which has enabling schedules.
0..*	RemedialActionDependency	0..1	RemedialActionDependency	(NC) Remedial action dependency which has enabling schedules.
1..1	EnablingTimePoint	1..*	EnablingTimePoint	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.28 (NC) GenericAvailableSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject

The schedule for the availability of elements.

Table 458 shows all attributes of GenericAvailableSchedule.

Table 458 – Attributes of ExtSchedule::GenericAvailableSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

Table 459 shows all association ends of GenericAvailableSchedule with other classes.

Table 459 – Association ends of ExtSchedule::GenericAvailableSchedule with other classes

mult from	name	mult to	type	description
0..*	RemedialAction	0..1	RemedialAction	(NC) Remedial action which has available schedules.
1..1	AvailabilityTimePoint	1..*	AvailabilityTimePoint	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.20.29 (NC) EnablingTimePoint root class

Enabling instruction value at a given point in time.

Table 460 shows all attributes of EnablingTimePoint.

Table 460 – 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.

Table 461 shows all association ends of EnablingTimePoint with other classes.

Table 461 – Association ends of ExtSchedule::EnablingTimePoint with other classes

mult from	name	mult to	type	description
1..*	GenericEnablingSchedule	1..1	GenericEnablingSchedule	(NC) The enabling schedule which belongs to the enabling timepoint.

3.20.30 (NC) AvailabilityTimePoint root class

Availability instruction value at a given point in time.
Table 462 shows all attributes of AvailabilityTimePoint.

Table 462 – 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.

Table 463 shows all association ends of AvailabilityTimePoint with other classes.

Table 463 – Association ends of ExtSchedule::AvailabilityTimePoint with other classes

mult from	name	mult to	type	description
1..*	GenericAvailabilitySchedule	1..1	GenericAvailableSchedule	(NC) The availability schedule which belongs to the availability timepoint.

3.20.31 (NC) InfeedLimitSchedule

Inheritance path = BaseIrregularTimeSeries : BaseTimeSeries : IdentifiedObject : ExtEuIdentifiedObject
The schedule for an infeed limit.
Table 464 shows all attributes of InfeedLimitSchedule.

Table 464 – Attributes of ExtSchedule::InfeedLimitSchedule

name	mult	type	description
generatedAtTime	0..1	DateTime	inherited from: BaseTimeSeries
interpolationKind	0..1	TimeSeriesInterpolationKind	inherited from: BaseTimeSeries
kind	0..1	BaseTimeSeriesKind	inherited from: BaseTimeSeries
method	0..1	String	inherited from: BaseTimeSeries
percentile	0..1	Integer	inherited from: BaseTimeSeries
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

Table 465 shows all association ends of InfeedLimitSchedule with other classes.

3865 **Table 465 – Association ends of ExtSchedule::InfeedLimitSchedule with other classes**

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

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3867 ### 3.20.32 (NC) PowerBidDependencyKind enumeration

3868 Kind of power bid dependency.
3869 Table 466 shows all literals of PowerBidDependencyKind.

3870 **Table 466 – 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.

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3872 ### 3.20.33 (NC) InfeedLimitTimePoint root class

3873 Infeed limit values at a given point in time.
3874 Table 467 shows all attributes of InfeedLimitTimePoint.

3875 **Table 467 – 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.

3876
3877 Table 468 shows all association ends of InfeedLimitTimePoint with other classes.

3878 **Table 468 – Association ends of ExtSchedule::InfeedLimitTimePoint with other classes**

mult from	name	mult to	type	description
1..*	InfeedLimitSchedule	1..1	InfeedLimitSchedule	(NC) The infeed limit schedule that has this time point.

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3.21 SIPS extensions

3.21.1 General

This package contains the extensions related to the SIPS which is a kind of remedial action scheme. A remedial action scheme can have different stages. Each stage represents the change of values of one element in the grid model compared to the base case is described by the grid state alteration. Each stage can have multiple triggers that have a priority and one or many conditions. When the condition (gate) is reached, the grid state alteration is activated.
A remedial action scheme is a kind of a remedial action. In this way, the remedial action scheme participates in the optimization of the remedial actions.

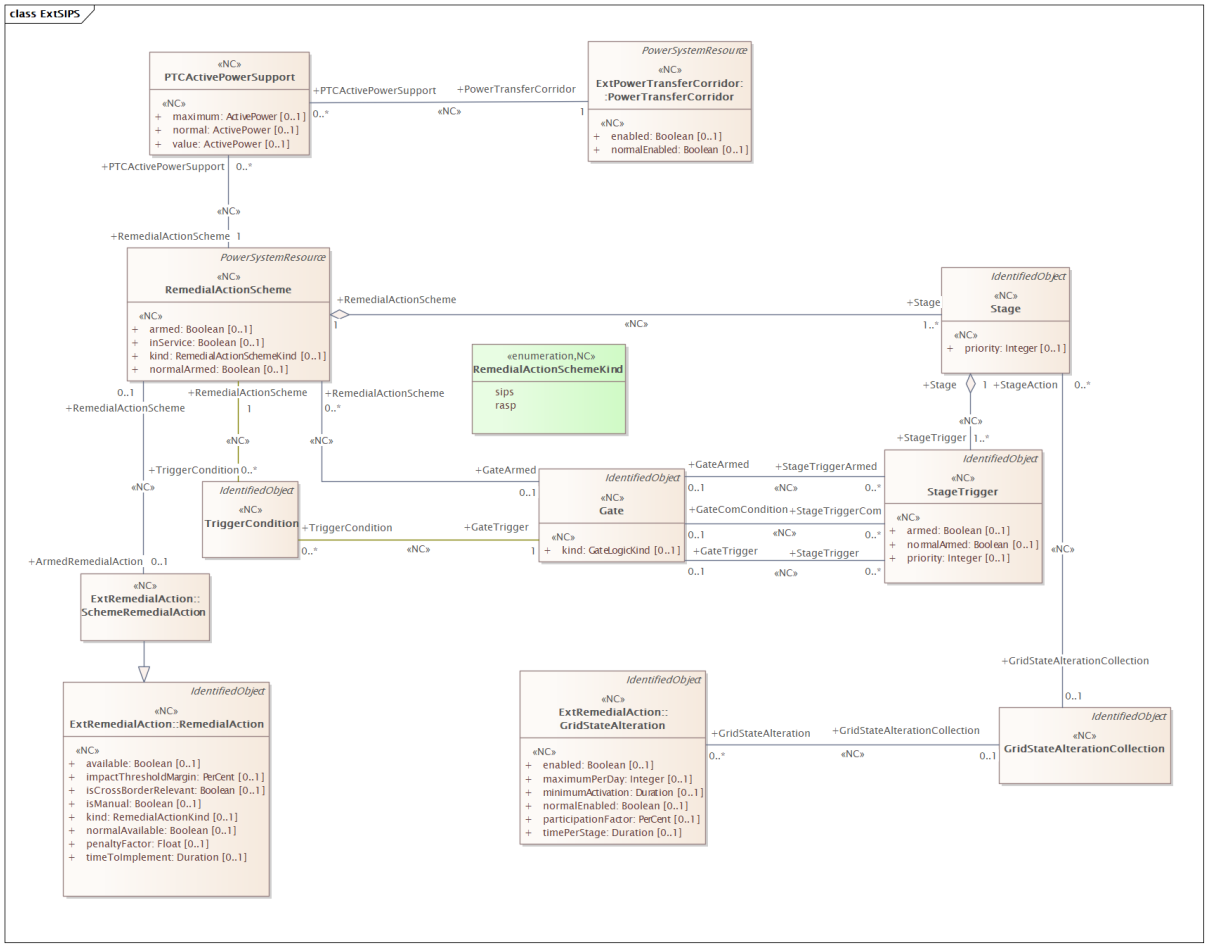

Figure 39 – Class diagram ExtSIPS::ExtSIPS

Figure 39: The diagram contains classes related to SIPS.

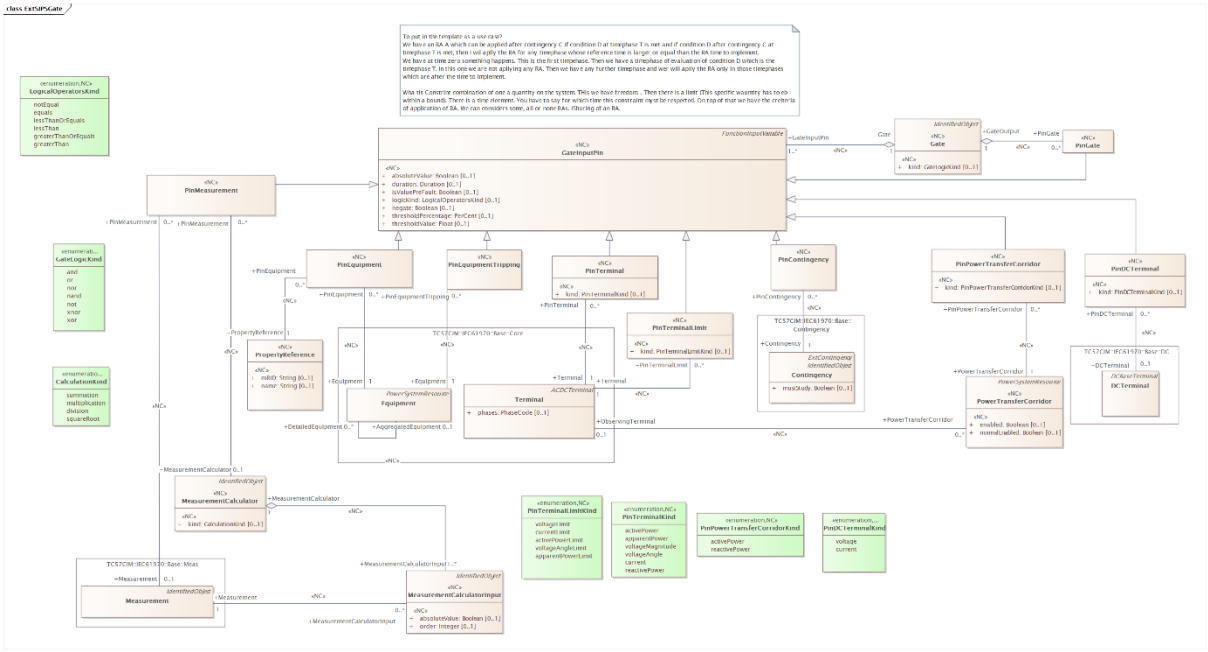

Figure 40 – Class diagram ExtSIPS::ExtSIPSGate

Figure 40: The diagram contains classes related to SIPS gate.

3.21.2 (NC) Gate

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Logical gate that supports a logical operation based on the input.
Table 469 shows all attributes of Gate.

Table 469 – Attributes of ExtSIPS::Gate

name	mult	type	description
kind	0..1	GateLogicKind	(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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 470 shows all association ends of Gate with other classes.

Table 470 – Association ends of ExtSIPS::Gate with other classes

mult from	name	mult to	type	description
0..1	RemedialActionScheme	0..*	RemedialActionScheme	(NC) The remedial action scheme which has an armed gate.
1..1	PinGate	0..*	PinGate	(NC) The pin for this gate output.
1..1	GateInputPin	1..*	GateInputPin	(NC) This is the input to the gate.
0..1	StageTriggerArmed	0..*	StageTrigger	(NC) The stage trigger associated with the armed gate.

mult from	name	mult to	type	description
0..1	StageTrigger	0..*	StageTrigger	(NC) The stage trigger associated with the gate trigger.
0..1	StageTriggerCom	0..*	StageTrigger	(NC) The stage trigger associated with the communication gate.
1..1	TriggerCondition	0..*	TriggerCondition	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.3 (NC) GateInputPin

Inheritance path = FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject
Input pin for a logical gate. The condition described in the input pin gives a logical true or false. The result from measurement and calculation are converted to a true or false.
Table 471 shows all attributes of GateInputPin.

Table 471 – 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	LogicalOperatorsKind	(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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 472 shows all association ends of GateInputPin with other classes.

Table 472 – Association ends of ExtSIPS::GateInputPin with other classes

mult from	name	mult to	type	description
1..*	Gate	1..1	Gate	(NC) The Gate that has this input.
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.4 (NC) GridStateAlterationCollection

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
A collection of grid state alterations.
Table 473 shows all attributes of GridStateAlterationCollection.

Table 473 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 474 shows all association ends of GridStateAlterationCollection with other classes.

Table 474 – Association ends of ExtSIPS::GridStateAlterationCollection with other classes

mult from	name	mult to	type	description
0..1	AvailabilitySchedule	0..*	AvailabilitySchedule	(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	GridStateAlteration	0..*	GridStateAlteration	(NC) The GridStateAlteration that belongs to the collection.
0..1	StageAction	0..*	Stage	(NC) The stage action related to this GridStateAlterationCollection.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.5 (NC) MeasurementCalculator

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Result of a calculation of one or more measurement.
Table 475 shows all attributes of MeasurementCalculator.

Table 475 – Attributes of ExtSIPS::MeasurementCalculator

name	mult	type	description
kind	0..1	CalculationKind	(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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 476 shows all association ends of MeasurementCalculator with other classes.

Table 476 – Association ends of ExtSIPS::MeasurementCalculator with other classes

mult from	name	mult to	type	description
0..1	PinMeasurement	0..*	PinMeasurement	(NC) The pin that uses this input.
1..1	MeasurementCalculatorInput	1..*	MeasurementCalculatorInput	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.6 (NC) MeasurementCalculatorInput

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Input to measurement calculation. It supports Analog, Discrete and Accumulator measurements.
Table 477 shows all attributes of MeasurementCalculatorInput.

Table 477 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 478 shows all association ends of MeasurementCalculatorInput with other classes.

Table 478 – Association ends of ExtSIPS::MeasurementCalculatorInput with other classes

mult from	name	mult to	type	description
1..*	MeasurementCalculator	1..1	MeasurementCalculator	(NC) The measurement calculator using this calculator input.
0..*	Measurement	1..1	Measurement	(NC) Measurement used as input to a calculation.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.7 (NC) PinContingency

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with a Contingency. It is used for comparison.

Table 479 shows all attributes of PinContingency.

Table 479 – Attributes of ExtSIPS::PinContingency

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
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

Table 480 shows all association ends of PinContingency with other classes.

Table 480 – 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	Gate	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.8 (NC) PinDCTerminal

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with a DCTerminal. It is used for comparison.

Table 481 shows all attributes of PinDCTerminal.

Table 481 – Attributes of ExtSIPS::PinDCTerminal

name	mult	type	description
kind	0..1	PinDCTerminalKind	(NC) The kind of quantity which is used as an input value.
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
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

Table 482 shows all association ends of PinDCTerminal with other classes.

Table 482 – 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	Gate	(NC) inherited from: GateInputPin

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

3.21.9 (NC) PinEquipment

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with an Equipment. It is used for the comparison.

Table 483 shows all attributes of PinEquipment.

Table 483 – Attributes of ExtSIPS::PinEquipment

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
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

Table 484 shows all association ends of PinEquipment with other classes.

Table 484 – 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	PropertyReference	(NC) The property reference for this pin equipment.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.10 (NC) PinEquipmentTripping

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with an Equipment. It is used to determine if the equipment is tripped between two consecutive stages, i.e. the equipment is in service at pre-fault stage and it is out of service at post-fault stage.

Table 485 shows all attributes of PinEquipmentTripping.

Table 485 – Attributes of ExtSIPS::PinEquipmentTripping

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
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

Table 486 shows all association ends of PinEquipmentTripping with other classes.

Table 486 – 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	Gate	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.11 (NC) PinGate

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

An output from one gate represents an input to another gate.

Table 487 shows all attributes of PinGate.

Table 487 – Attributes of ExtSIPS::PinGate

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
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

Table 488 shows all association ends of PinGate with other classes.

Table 488 – Association ends of ExtSIPS::PinGate with other classes

mult from	name	mult to	type	description
0..*	GateOutput	1..1	Gate	(NC) The output of the gate.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.12 (NC) PinMeasurement

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with a Measurement. It is used for comparison.

Table 489 shows all attributes of PinMeasurement.

Table 489 – Attributes of ExtSIPS::PinMeasurement

name	mult	type	description
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin

name	mult	type	description
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
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

Table 490 shows all association ends of PinMeasurement with other classes.

Table 490 – 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	MeasurementCalculator	(NC) The result of the calculation used as input to a gate.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.13 (NC) PinPowerTransferCorridor

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with a PowerTransferCorridor. It is used for comparison.

Table 491 shows all attributes of PinPowerTransferCorridor.

Table 491 – Attributes of ExtSIPS::PinPowerTransferCorridor

name	mult	type	description
kind	0..1	PinPowerTransferCorridorKind	(NC) The kind of quantity which is used as an input value.
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin

name	mult	type	description
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
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

Table 492 shows all association ends of PinPowerTransferCorridor with other classes.

Table 492 – Association ends of ExtSIPS::PinPowerTransferCorridor with other classes

mult from	name	mult to	type	description
0..*	PowerTransferCorridor	1..1	PowerTransferCorridor	(NC) The PowerTransferCorridor that is used in the input pin.
1..*	Gate	1..1	Gate	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.14 (NC) PinTerminal

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with a Terminal. It is used for comparison.

Table 493 shows all attributes of PinTerminal.

Table 493 – Attributes of ExtSIPS::PinTerminal

name	mult	type	description
kind	0..1	PinTerminalKind	(NC) The kind of quantity which is used as an input value.
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 494 shows all association ends of PinTerminal with other classes.

Table 494 – 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	Gate	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.15 (NC) PinTerminalLimit

Inheritance path = GateInputPin : FunctionInputVariable : IdentifiedObject : ExtEuIdentifiedObject

Input pin associated with the limits of a Terminal. It is used for comparison.

Table 495 shows all attributes of PinTerminalLimit.

Table 495 – Attributes of ExtSIPS::PinTerminalLimit

name	mult	type	description
kind	0..1	PinTerminalLimitKind	(NC) The kind of limit which is used as an input value.
absoluteValue	0..1	Boolean	(NC) inherited from: GateInputPin
duration	0..1	Duration	(NC) inherited from: GateInputPin
logicKind	0..1	LogicalOperatorsKind	(NC) inherited from: GateInputPin
negate	0..1	Boolean	(NC) inherited from: GateInputPin
thresholdPercentage	0..1	PerCent	(NC) inherited from: GateInputPin
thresholdValue	0..1	Float	(NC) inherited from: GateInputPin
isValuePreFault	0..1	Boolean	(NC) inherited from: GateInputPin
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

Table 496 shows all association ends of PinTerminalLimit with other classes.

Table 496 – Association ends of ExtSIPS::PinTerminalLimit 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	Gate	(NC) inherited from: GateInputPin
1..*	Function	0..1	FunctionBlock	(NC) inherited from: FunctionInputVariable
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.16 (NC) PTCActivePowerSupport root class

Defines the active power capability (support) of the scheme in relation to a PowerTransferCorridor.

Table 497 shows all attributes of PTCActivePowerSupport.

Table 497 – 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).

Table 498 shows all association ends of PTCActivePowerSupport with other classes.

Table 498 – Association ends of ExtSIPS::PTCActivePowerSupport with other classes

mult from	name	mult to	type	description
0..*	PowerTransferCorridor	1..1	PowerTransferCorridor	(NC) The PowerTransferCorridor that has a specific active power support.
0..*	RemedialActionScheme	1..1	RemedialActionScheme	(NC) The RemedialActionScheme which has active power support from the PowerTransferCorridor.

3.21.17 (NC) RemedialActionScheme

Inheritance path = PowerSystemResource : IdentifiedObject : ExtEuIdentifiedObject

Remedial Action Scheme (RAS), Special Protection Schemes (SPS), System Protection Schemes (SPS) or System Integrity Protection Schemes (SIPS).

A Remedial Action Scheme consists of one or more stages that can trigger and execute a protection action.
Table 499 shows all attributes of RemedialActionScheme.

Table 499 – 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	RemedialActionSchemeKind	(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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 500 shows all association ends of RemedialActionScheme with other classes.

Table 500 – Association ends of ExtSIPS::RemedialActionScheme with other classes

mult from	name	mult to	type	description
0..1	ArmedRemedialAction	0..1	SchemeRemedialAction	(NC) Armed remedial action for a remedial action scheme.
0..1	AvailabilityRemedialActionScheme	0..*	AvailabilityRemedialActionScheme	(NC) Availability remedial action scheme describe the availabiltiy that affect this remedial action scheme.
0..*	GateArmed	0..1	Gate	(NC) Gate that through a gate logic and input pin defines arming of a Remedial Action Scheme.
1..1	PTCActivePowerSupport	0..*	PTCActivePowerSupport	(NC) The active power support of the PowerTransferCorridor related to this RemedialActionScheme.
1..1	TriggerCondition	0..*	TriggerCondition	(NC) The triggering condition of this Remedial Action Scheme.
1..1	Stage	1..*	Stage	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.18 (NC) Stage

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Stage of a remedial action scheme.
Table 501 shows all attributes of Stage.

Table 501 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 502 shows all association ends of Stage with other classes.

Table 502 – Association ends of ExtSIPS::Stage with other classes

mult from	name	mult to	type	description
1..*	RemedialActionScheme	1..1	RemedialActionScheme	(NC) The remedial action scheme that has a stage.
0..*	GridStateAlterationCollection	0..1	GridStateAlterationCollection	(NC) The GridStateAlterationCollection which belongs to the Stage.
1..1	StageTrigger	1..*	StageTrigger	(NC) The state trigger that is part of this stage.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.19 (NC) StageTrigger

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Stage that is triggered either by TriggerCondition or by gate condition within a stage.
Table 503 shows all attributes of StageTrigger.

Table 503 – 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.
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

Table 504 shows all association ends of StageTrigger with other classes.

Table 504 – Association ends of ExtSIPS::StageTrigger with other classes

mult from	name	mult to	type	description
0..*	GateArmed	0..1	Gate	(NC) The gate that is the input pin which defines arming of the StageTrigger.
0..*	GateTrigger	0..1	Gate	(NC) The gate that is the input pin which triggers the protective reactions.
0..*	GateComCondition	0..1	Gate	(NC) The gate that is the input pin which defines a communication condition.
1..*	Stage	1..1	Stage	(NC) The stage that has this stage trigger.
0..1	DiagramObjects	0..*	DiagramObject	inherited from: IdentifiedObject
1..1	Names	0..*	Name	inherited from: IdentifiedObject
0..1	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.20 (NC) TriggerCondition

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

The condition that triggers a remedial action scheme.

Table 505 shows all attributes of TriggerCondition.

Table 505 – 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

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

Table 506 shows all association ends of TriggerCondition with other classes.

Table 506 – Association ends of ExtSIPS::TriggerCondition with other classes

mult from	name	mult to	type	description
0..*	GateTrigger	1..1	Gate	(NC) The gate that is the condition for the trigger.
0..*	RemedialActionScheme	1..1	RemedialActionScheme	(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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.21.21 (NC) CalculationKind enumeration

Kind of calculation operation that can be done to Measurement.
Table 507 shows all literals of CalculationKind.

Table 507 – 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).

3.21.22 (NC) GateLogicKind enumeration

Define the different logical operations.
Table 508 shows all literals of GateLogicKind.

Table 508 – Literals of ExtSIPS::GateLogicKind

literal	value	description
and		A logical AND operation. True when all inputs are true.
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.

literal	value	description
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.

4093

4094 **3.21.23 (NC) LogicalOperatorsKind enumeration**

4095 Kinds of logical operators for comparison.
4096 Table 509 shows all literals of LogicalOperatorsKind.

4097 **Table 509 – 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.

4098

4099 **3.21.24 (NC) PinDCTerminalKind enumeration**

4100 The kind of quantities that can serve as an input value for the DCTerminal pin.
4101 Table 510 shows all literals of PinDCTerminalKind.

4102 **Table 510 – Literals of ExtSIPS::PinDCTerminalKind**

literal	value	description
voltage		Direct current voltage in the DCTerminal.
current		Direct current in the DCTerminal.

4103

4104 **3.21.25 (NC) PinPowerTransferCorridorKind enumeration**

4105 The kind of quantities that can serve as an input value for the PowerTransferCorridor pin.
4106 Table 511 shows all literals of PinPowerTransferCorridorKind.

4107 **Table 511 – Literals of ExtSIPS::PinPowerTransferCorridorKind**

literal	value	description
activePower		Active power in the branch group.
reactivePower		Reactive power in the branch group.

4108

4109 **3.21.26 (NC) PinTerminalKind enumeration**

4110 The kind of quantities that can serve as an input value for the pin.
4111 Table 512 shows all literals of PinTerminalKind.

Table 512 – 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.

3.21.27 (NC) PinTerminalLimitKind enumeration

The kind of limits that can serve as an input value for the pin.
Table 513 shows all literals of PinTerminalLimitKind.

Table 513 – Literals of ExtSIPS::PinTerminalLimitKind

literal	value	description
voltageLimit		The voltage limit is an input value.
currentLimit		The current limit is an input value.
activePowerLimit		The active power limit is an input value.
voltageAngleLimit		The voltage angle limit is an input value.
apparentPowerLimit		The apparent power limit is an input value.

3.21.28 (NC) RemedialActionSchemeKind enumeration

Classification of Remedial Action Scheme.
Table 514 shows all literals of RemedialActionSchemeKind.

Table 514 – 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.

3.22 Package ExtFaultsPRA

3.22.1 General

The package includes extensions related to reporting fault situations in the power system.

3.22.2 Package ExtFaultCause

3.22.2.1 General

Extensions related to fault cause.

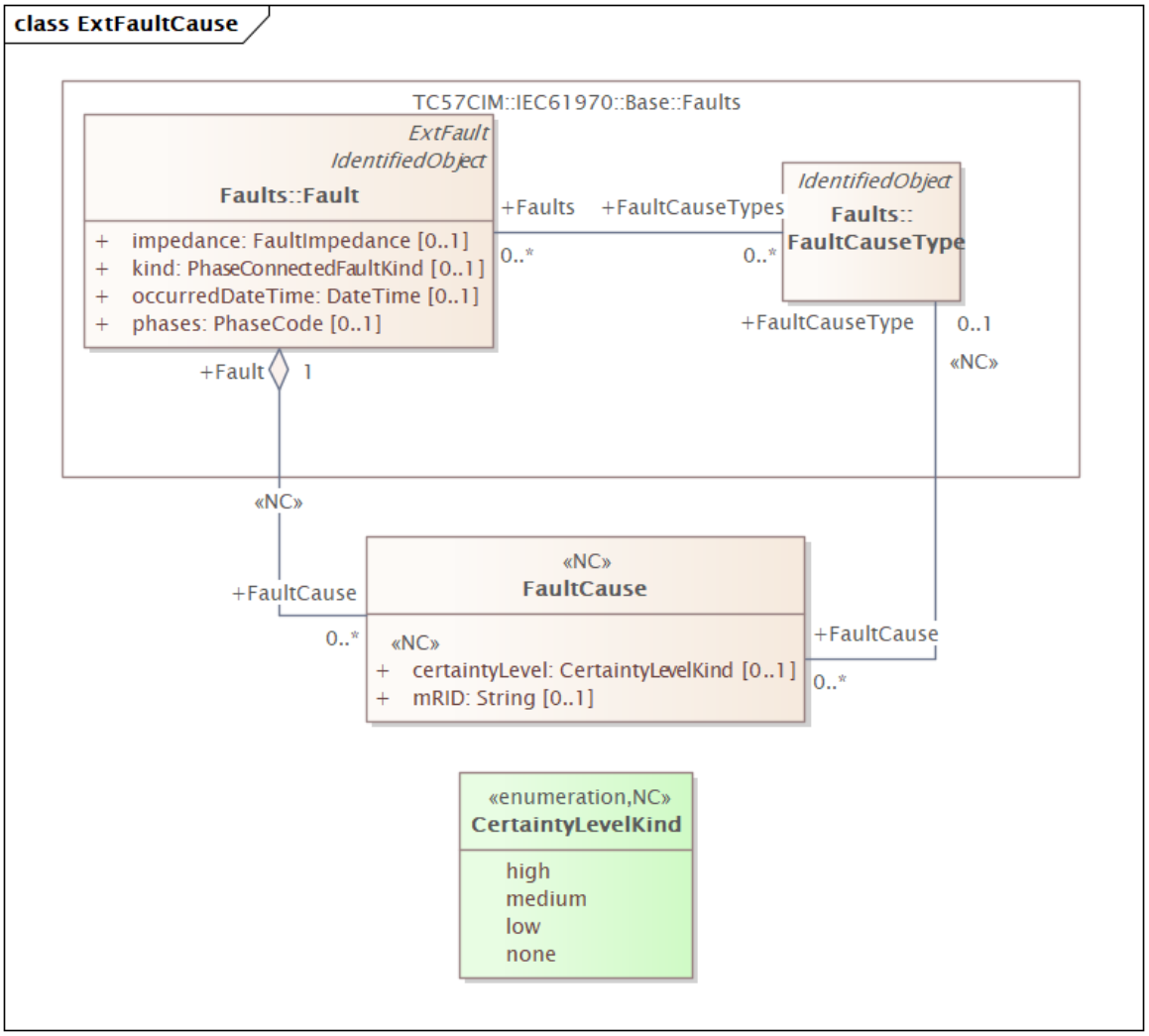

Figure 41 – Class diagram ExtFaultCause::ExtFaultCause

Figure 41: The diagram contains classes and attributes related to the extensions.

3.22.2.2 (NC) FaultCause root class

Fault cause.

Table 515 shows all attributes of FaultCause.

Table 515 – Attributes of ExtFaultCause::FaultCause

name	mult	type	description
certaintyLevel	0..1	CertaintyLevelKind	(NC) The degree of certainty of which the cause of a fault is determined by a user. 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.

name	mult	type	description
			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.

Table 516 shows all association ends of FaultCause with other classes.

Table 516 – Association ends of ExtFaultCause::FaultCause with other classes

mult from	name	mult to	type	description
0..*	FaultCauseType	0..1	FaultCauseType	(NC) The fault and cause combination to be simulated for this cause.
0..*	Fault	1..1	Fault	(NC) The fault defined for this fault and cause combination.

3.22.2.3 (NC) CertaintyLevelKind enumeration

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.
Table 517 shows all literals of CertaintyLevelKind.

Table 517 – 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.

3.22.3 Package ExtGridDisturbance

3.22.3.1 General

Extensions relate to grid disturbance.

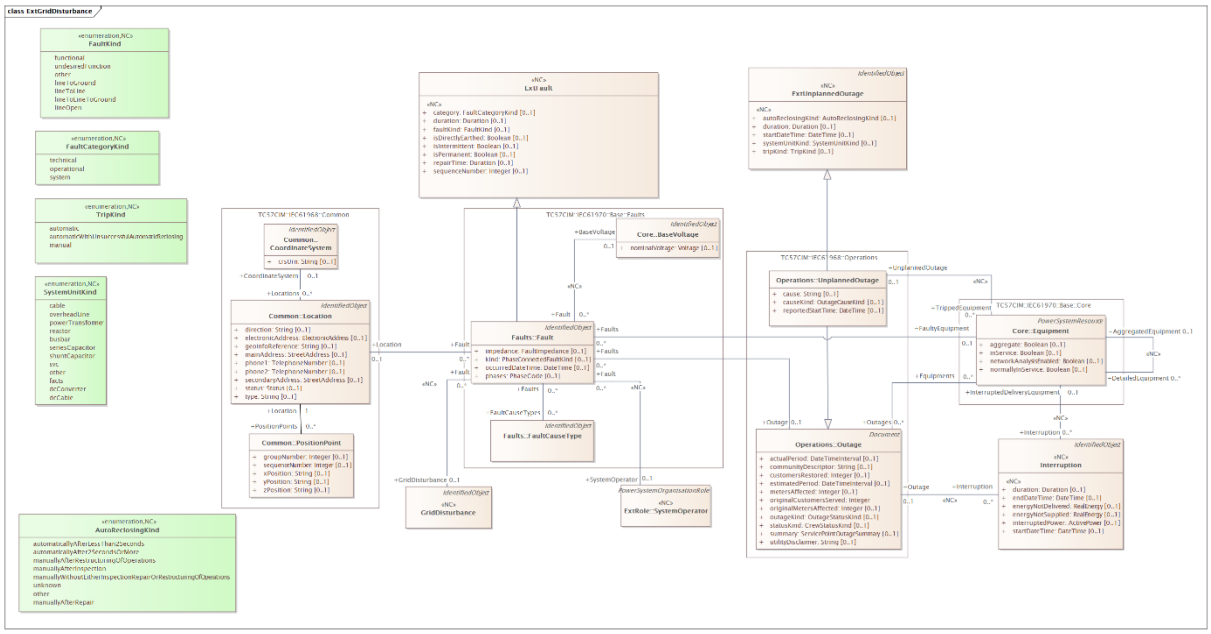

Figure 42 – Class diagram ExtGridDisturbance::ExtGridDisturbance

Figure 42: The diagram contains classes and attributes related to the extensions.

3.22.3.2 (NC) ExtFault root class

A fault of a component is defined as the inability to perform as required, due to an internal state. Table 518 shows all attributes of ExtFault.

Table 518 – Attributes of ExtGridDisturbance::ExtFault

name	mult	type	description
category	0..1	FaultCategoryKind	(NC) The fault category.
duration	0..1	Duration	(NC) The duration of the fault.
faultKind	0..1	FaultKind	(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 same reason which repeats itself before it becomes necessary to carry out any repairs or eliminate the cause [8]. A non-intermittent fault occurs only once. 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. Note 2: one example of an intermittent fault is galloping lines. Note 3: when deciding whether a fault is intermittent or not, one should consider more of the cause, location and consequence of the fault

name	mult	type	description
			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. Note 4: there is no standard for the required timespan between intermittent faults. Some system operators use 2 hours.
repairTime	0..1	Duration	(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. 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. Note 2: the repair time is zero if a fault is left unrepaired deliberately. 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.
sequenceNumber	0..1	Integer	(NC) A chronological serial number indicating the order of the faults related to the grid disturbance. Primary faults have fault ID "1", and secondary/latent faults have fault ID "2" or more.
isDirectlyEarthed	0..1	Boolean	(NC) Whether the power system is directly earthed (true) or compensated (false). Usually optional for faults on units with reactive compensation with voltages lower than 100 kV.
isPermanent	0..1	Boolean	(NC) Whether the fault is a permanent (true) or a temporary (false) fault. A permanent fault is a fault that will remain unless it is removed by some intervention. Note 1 to entry: The "intervention" may be modification or maintenance. 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. Note 3: the duration of the disconnection is irrelevant when determining if a fault is permanent or not. 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. Note 1: a temporary fault does not require measures other than the reconnection of circuit breakers, replacement of fuses or signal acknowledgement. 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

name	mult	type	description
			considered to be temporary as no repairs are carried out.

4157

4158 **3.22.3.3 (NC) ExtUnplannedOutage**

4159 Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
4160 An event where a component or unit gets partially or fully isolated from the system.
4161 Table 519 shows all attributes of ExtUnplannedOutage.

4162 **Table 519 – 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	TripKind	(NC) Whether the type of the trip due to the outage was automatic, automatic with successful automatic reclosing or manual. In case of a fault in the reclosing automatics resulting in lack of reclosing, automatic should be chosen as an alternative.
autoReclosingKind	0..1	AutoReclosingKind	(NC) The type of autoreclosing that occurred with the trip. 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. In this document, high-speed automatic reclosing refers to automatic reclosing after less than 2 seconds.
systemUnitKind	0..1	SystemUnitKind	(NC) The type of system unit of the component affected by the outage. A system unit is defined as: A group of components which are delimited by one or more circuit breakers. 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. Note 2: the circuit breakers are not included in the system unit. 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

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

Table 520 shows all association ends of ExtUnplannedOutage with other classes.

Table 520 – Association ends of ExtGridDisturbance::ExtUnplannedOutage 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.22.3.4 (NC) GridDisturbance

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject
Automatic, unintended, or manual undeferrable switching of breakers as a result of faults in the power grid.
Table 521 shows all attributes of GridDisturbance.

Table 521 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 522 shows all association ends of GridDisturbance with other classes.

Table 522 – 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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.22.3.5 (NC) Interruption

Inheritance path = IdentifiedObject : ExtEuIdentifiedObject

Disappearance of the supply voltage at a delivery point.
Table 523 shows all attributes of Interruption.

Table 523 – 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: ExtEuIdentifiedObject
shortName	0..1	String	(European) inherited from: ExtEuIdentifiedObject

Table 524 shows all association ends of Interruption with other classes.

Table 524 – 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.
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	ParameterEvent	0..*	ParameterEvent	inherited from: IdentifiedObject
0..1	AlternativeIdentifier	0..*	Name	(NC) inherited from: IdentifiedObject
0..1	Name	0..*	Name	(NC) inherited from: IdentifiedObject

3.22.3.6 (NC) AutoReclosingKind enumeration

The type of autoreclosing that occurred with the trip.
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.
In this document, high-speed automatic reclosing refers to automatic reclosing after less than 2 seconds.
Table 525 shows all literals of AutoReclosingKind.

Table 525 – 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.

3.22.3.7 (NC) FaultCategoryKind enumeration

The available kinds of fault categories.
Table 526 shows all literals of FaultCategoryKind.

Table 526 – 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 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.

3.22.3.8 (NC) FaultKind enumeration

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.
Table 527 shows all literals of FaultKind.

4208 **Table 527 – 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.

4209

4210 **3.22.3.9 (NC) SystemUnitKind enumeration**

4211 A system unit is defined as:
4212 A group of components which are delimited by one or more circuit breakers.
4213 Note 1: the system unit concept has been defined to simplify the calculation of availability. While
4214 a system unit is always delimited by circuit breakers, an individual component may not always
4215 be. A system unit may therefore contain more than one component.
4216 Note 2: the circuit breakers are not included in the system unit.
4217 Note 3: a tripped element is synonymous to a tripped system unit.
4218 Note 4: the type of a system unit is determined by its dominant component. The available system
4219 unit types are power transformer, overhead line, cable, reactor, busbar, series capacitor, shunt
4220 capacitor and SVC.
4221 Note 5: when a system unit is no longer transporting or supplying electrical energy, the system
4222 unit is affected by an outage. The system unit is unavailable after the outage has occurred.
4223 Table 528 shows all literals of SystemUnitKind.

Table 528 – 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 DCConverter.
dcCable		If the main function of the system unit is DCCable.

3.22.3.10 (NC) TripKind enumeration

Whether the type of the trip due to the outage was automatic, automatic with successful automatic reclosing or manual.
In case of a fault in the reclosing automatics resulting in lack of reclosing, automatic should be chosen as an alternative.
Table 529 shows all literals of TripKind.

Table 529 – Literals of ExtGridDisturbance::TripKind

literal	value	description
automatic		The trip that resulted in the outage was automatic. 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.

3.22.4 Package ExtFaultOutage

3.22.4.1 General

Extensions related to fault outage.

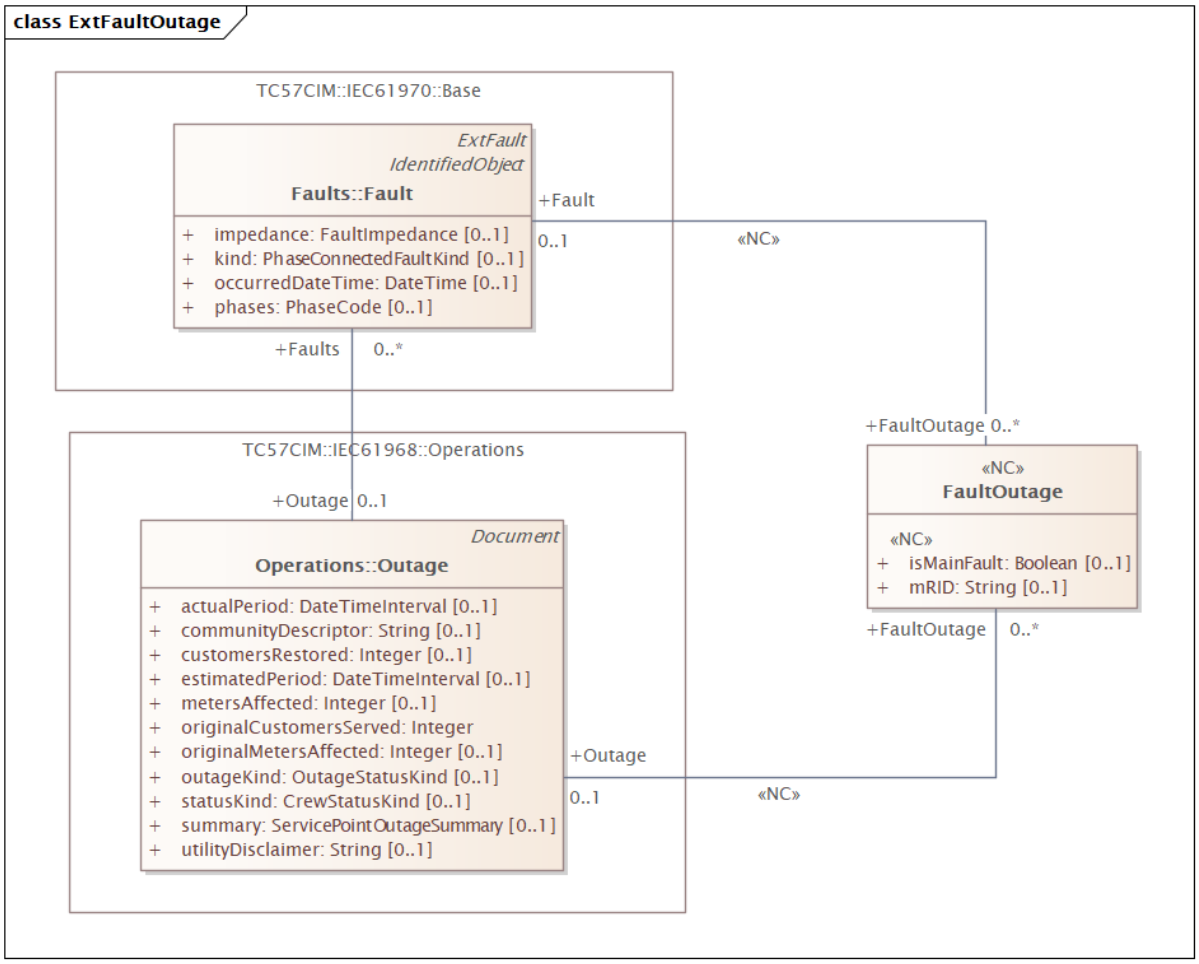

Figure 43 – Class diagram ExtFaultOutage::ExtFaultOutage

Figure 43: The diagram contains classes and attributes related to the extensions.

3.22.4.2 (NC) FaultOutage root class

Association class for relating one fault and one outage.
Table 530 shows all attributes of FaultOutage.

Table 530 – 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.

Table 531 shows all association ends of FaultOutage with other classes.

4246 **Table 531 – 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.

4247

4248 ## 3.23 Package ExtPowerSystemProject

4249 ### 3.23.1 General

4250 The package includes extensions related to power system project.

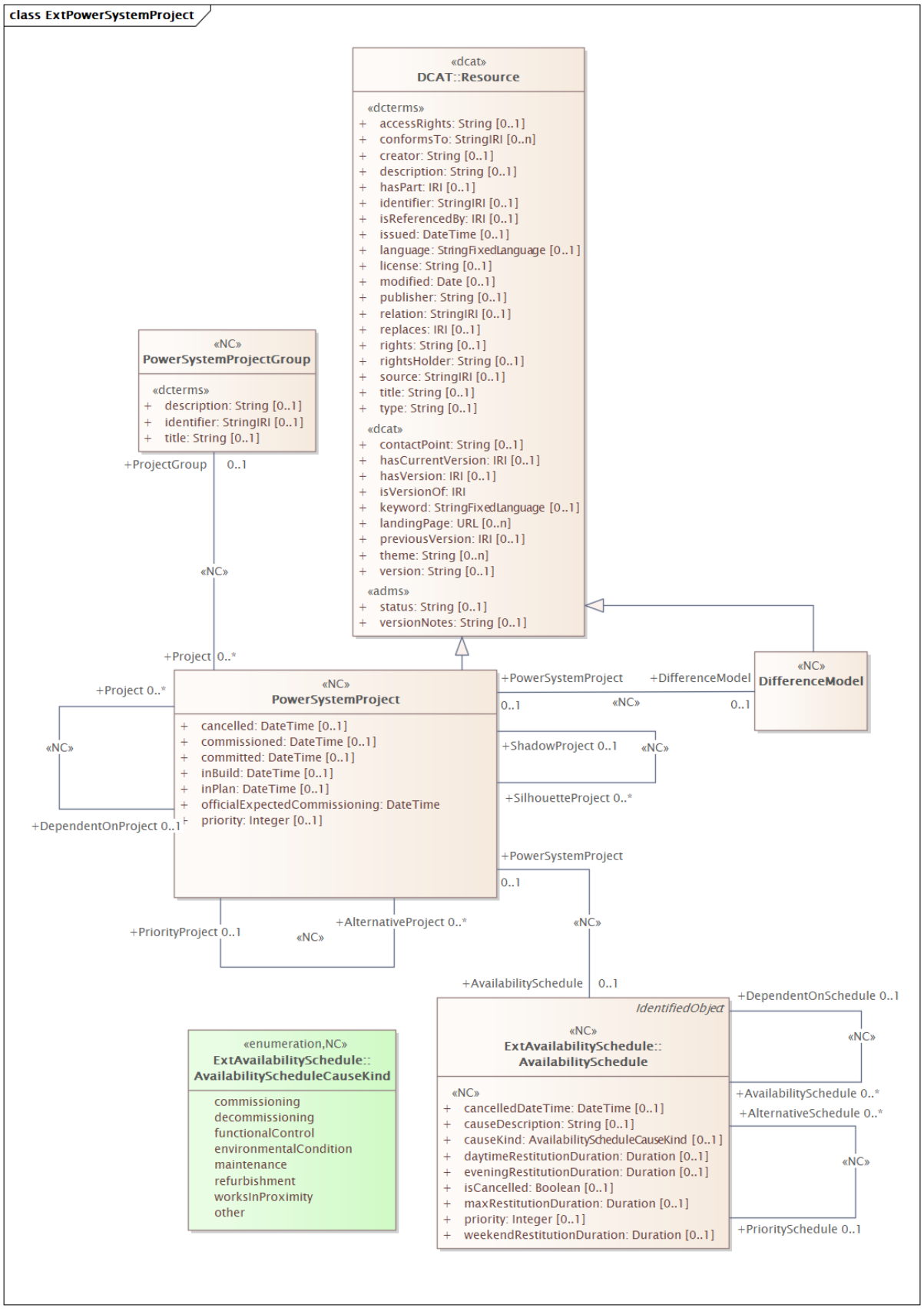

Figure 44 – Class diagram ExtPowerSystemProject::ExtPowerSystemProject

Figure 44: The diagram shows the extensions related to power system project.

3.23.2 (NC) DifferenceModel

Inheritance path = Resource
A set of statements describing the changes in the network model. The statement is defined in the difference model.
Table 532 shows all attributes of DifferenceModel.

Table 532 – 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	StringIRI	(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	StringFixedLanguage	(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

Table 533 shows all association ends of DifferenceModel with other classes.

4262 **Table 533 – Association ends of ExtPowerSystemProject::DifferenceModel with other**
4263 **classes**

mult from	name	mult to	type	description
0..1	PowerSystemProject	0..1	PowerSystemProject	(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

4264

4265 ### 3.23.3 (NC) PowerSystemProject

4266 Inheritance path = Resource
4267 Knowledge data for the power system project that describe the status and the planned
4268 implementation of the changes into the as-built model.
4269 Table 534 shows all attributes of PowerSystemProject.

4270 **Table 534 – 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	StringIRI	(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	StringFixedLanguage	(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

Table 535 shows all association ends of PowerSystemProject with other classes.

Table 535 – Association ends of ExtPowerSystemProject::PowerSystemProject with other classes

mult from	name	mult to	type	description
0..1	AvailabilitySchedule	0..1	AvailabilitySchedule	(NC) The availability schedule associated with this power system project.
0..1	DifferenceModel	0..1	DifferenceModel	(NC) The difference model describing this power system project.
0..*	ProjectGroup	0..1	PowerSystemProjectGroup	(NC) Power system project group to which this project belongs.
0..*	DependentOnProject	0..1	PowerSystemProject	(NC) Grouping of projects that are depending on each other. A project can only be linked to one dependent project.
0..*	ShadowProject	0..1	PowerSystemProject	(NC) A shadowing project that includes the same change set, but different timeline.
0..1	AlternativeProject	0..*	PowerSystemProject	(NC) Alternative project. Only one of the projects will be commissioned.
0..1	Project	0..*	PowerSystemProject	(NC) The project that has a dependent on project.
0..1	SilhouetteProject	0..*	PowerSystemProject	(NC) The project that has a shadow project.

mult from	name	mult to	type	description
0..*	PriorityProject	0..1	PowerSystemProject	(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

3.23.4 (NC) PowerSystemProjectGroup root class

A container with project that are grouped together. Primarily used for navigation and to highlight the phases that an overall project can go though.
Table 536 shows all attributes of PowerSystemProjectGroup.

Table 536 – 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.

Table 537 shows all association ends of PowerSystemProjectGroup with other classes.

Table 537 – Association ends of ExtPowerSystemProject::PowerSystemProjectGroup with other classes

mult from	name	mult to	type	description
0..1	Project	0..*	PowerSystemProject	(NC) The project included in the power system project group.

3.24 Package ExtReactiveCapabilityCurve

3.24.1 General

This package contains the extensions related to reactive capability curve.

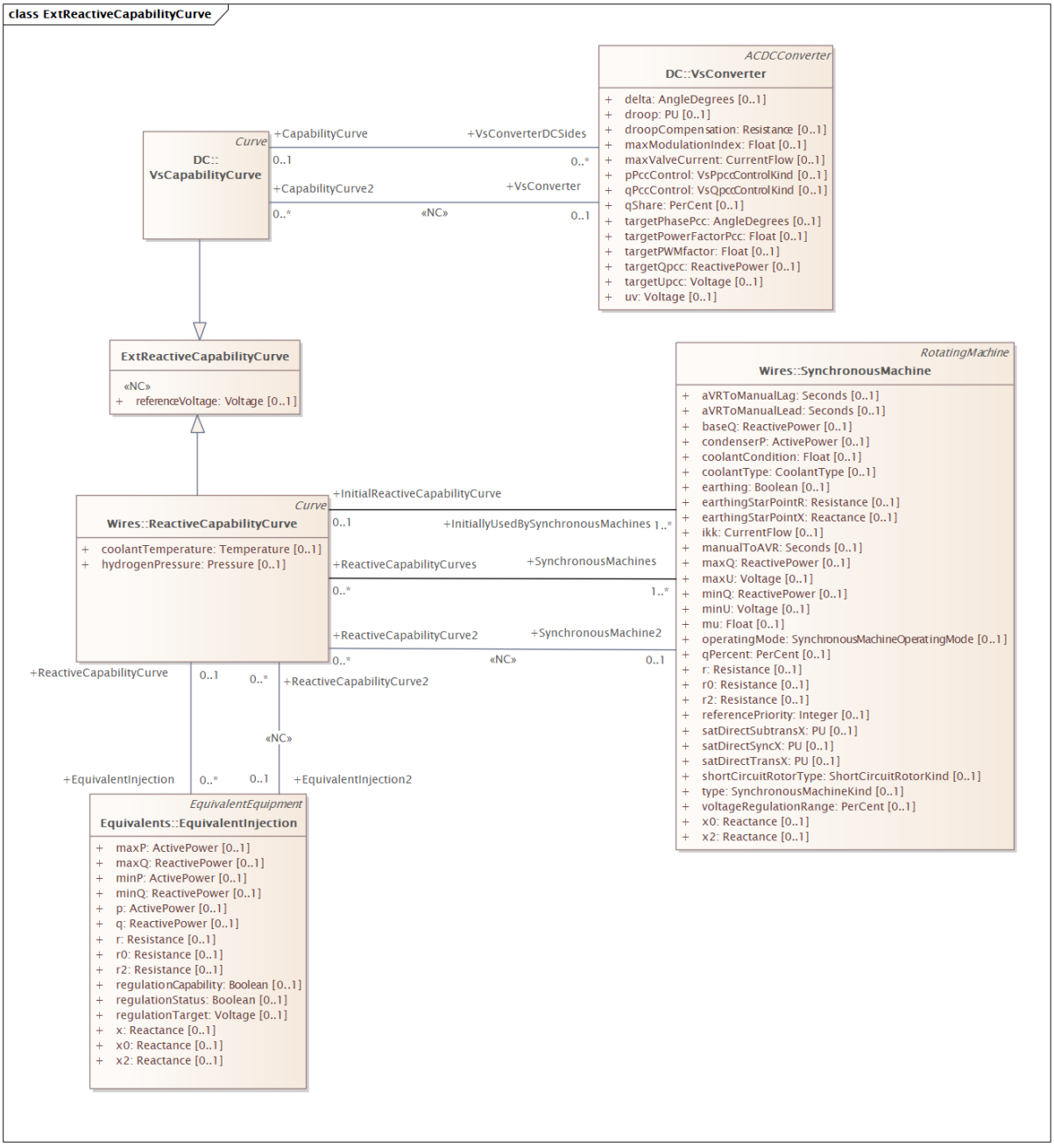

Figure 45 – Class diagram ExtReactiveCapabilityCurve::ExtReactiveCapabilityCurve

Figure 45: The diagram contains classes related to reactive capability curve.

3.24.2 ExtReactiveCapabilityCurve root class

European network codes extension to base CIM counterpart.
Table 538 shows all attributes of ExtReactiveCapabilityCurve.

Table 538 – Attributes of ExtReactiveCapabilityCurve::ExtReactiveCapabilityCurve

name	mult	type	description
referenceVoltage	0..1	Voltage	(NC) The reference voltage for which the capability curve is valid.