European Network of
Transmission System Operators
for Electricity

STEADY STATE INSTRUCTION PROFILE SPECIFICATION

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ICTC APPROVED
VERSION 2.5.0

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NOTE CONCERNING WORDING USED IN THIS DOCUMENT

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	Date	Paragraph	Comments
0.1.0	2021-10-12		For CIM EG review
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2.5.0	2026-09-10		ICTC approval.

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The steady state instruction profile enables an exchange of additional information related to MTU.

2 Application profile specification

2.1 Version information

The content is generated from UML model file CIM17-2_CGMES31v01_PROF-20v03_NC25v25_MS10v12_DES10v01.qea.

This edition is based on the IEC 61970 UML version ‘’, dated ‘’.

- Title:
- Keyword:
- Description:
- Version IRI:
- Version info:
- Prior version:
- Conforms to:
- Identifier:

2.2 Constraints naming convention

The naming of the rules shall not be used for machine processing. The rule names are just a string. The naming convention of the constraints is as follows.

“{rule.Type}:{rule.Standard}:{rule.Profile}:{rule.Property}:{rule.Name}”

where

rule.Type: C – for constraint; R – for requirement

rule.Standard: the number of the standard e.g. 301 for 61970-301, 456 for 61970-456, 13 for 61968-13. 61970-600 specific constraints refer to 600 although they are related to one or combination of the 61970-450 series profiles. For NC profiles, NC is used.

rule.Profile: the abbreviation of the profile, e.g. TP for Topology profile. If set to “ALL” the constraint is applicable to all IEC 61970-600 profiles.

rule.Property: for UML classes, the name of the class, for attributes and associations, the name of the class and attribute or association end, e.g. EnergyConsumer, IdentifiedObject.name, etc. If set to “NA” the property is not applicable to a specific UML element.

rule.Name: the name of the rule. It is unique for the same property.

Example: C:600:ALL:IdentifiedObject.name:stringLength

2.3 Profile constraints

This clause defines requirements and constraints that shall be fulfilled by applications that conform to this document.

This document is the master for rules and constraints tagged "NC". For the sake of self-containment, the list below also includes a copy of the relevant rules from IEC 61970-452, tagged "452".

- C:452:ALL:NA:datatypes

  According to 61970-501, datatypes are not exchanged in the instance data. The UnitMultiplier is 1 in cases none value is specified in the profile.

- R:452:ALL:NA:exchange

  Optional and required attributes and associations must be imported and exported if they are in the model file prior to import.

- R:452:ALL:NA:exchange1

  If an optional attribute does not exist in the imported file, it does not have to be exported in case exactly the same data set is exported, i.e. the tool is not obliged to automatically provide this attribute. If the export is resulting from an action by the user performed after the import, e.g. data processing or model update the export can contain optional attributes.

- R:452:ALL:NA:exchange2

  In most of the profiles the selection of optional and required attributes is made so as to ensure a minimum set of required attributes without which the exchange does not fulfil its basic purpose. Business processes governing different exchanges can require mandatory exchange of certain optional attributes or associations. Optional and required attributes and associations shall therefore be supported by applications which claim conformance with certain functionalities of the IEC 61970-452. This provides flexibility for the business processes to adapt to different business requirements and base the exchanges on IEC 61970-452 compliant applications.

- R:452:ALL:NA:exchange3

  An exporter may, at his or her discretion, produce a serialization containing additional class data described by the CIM Schema but not required by this document provided these data adhere to the conventions established in Clause 5.

- R:452:ALL:NA:exchange4

  From the standpoint of the model import used by a data recipient, the document describes a subset of the CIM that importing software shall be able to interpret in order to import exported models. Data providers are free to exceed the minimum requirements described herein as long as their resulting data files are compliant with the CIM Schema and the conventions established in Clause 5. The document, therefore, describes additional classes and class data that, although not required, exporters will, in all likelihood, choose to include in their data files. The additional classes and data are labelled as required (cardinality 1..1) or as optional (cardinality 0..1) to distinguish them from their required counterparts. Please note, however, that data importers could potentially receive data containing instances of any and all classes described by the CIM Schema.

- R:452:ALL:NA:cardinality

  The cardinality defined in the CIM model shall be followed, unless a more restrictive cardinality is explicitly defined in this document. For instance, the cardinality on the association between VoltageLevel and BaseVoltage indicates that a VoltageLevel shall

be associated with one and only one BaseVoltage, but a BaseVoltage can be associated with zero to many VoltageLevels.

- R:452:ALL:NA:associations

Associations between classes referenced in this document and classes not referenced here are not required regardless of cardinality.

- R:452:ALL:IdentifiedObject.name:rule

The attribute “name” inherited by many classes from the abstract class IdentifiedObject is not required to be unique. It must be a human readable identifier without additional embedded information that would need to be parsed. The attribute is used for purposes such as User Interface and data exchange debugging. The MRID defined in the data exchange format is the only unique and persistent identifier used for this data exchange. The attribute IdentifiedObject.name is, however, always required for CoreEquipment profile and Short Circuit profile.

- R:452:ALL:IdentifiedObject.description:rule

The attribute “description” inherited by many classes from the abstract class IdentifiedObject must contain human readable text without additional embedded information that would need to be parsed.

- R:452:ALL:NA:uniqueIdentifier

All IdentifiedObject-s shall have a persistent and globally unique identifier (Master Resource Identifier - mRID).

- R:452:ALL:NA:unitMultiplier

For exchange of attributes defined using CIM Data Types (ActivePower, Susceptance, etc.) a unit multiplier of 1 is used if the UnitMultiplier specified in this document is “none”.

- C:452:ALL:IdentifiedObject.name:stringLength

The string IdentifiedObject.name has a maximum of 128 characters.

- C:452:ALL:IdentifiedObject.description:stringLength

The string IdentifiedObject.description is maximum 256 characters.

- C:452:ALL:NA:float

An attribute that is defined as float (e.g. has a type Float or a type which is a Datatype with .value attribute of type Float) shall support ISO/IEC 60559:2020 for floating-point arithmetic using single precision floating point. A single precision float supports 7 significant digits where the significant digits are described as an integer, or a decimal number with 6 decimal digits. Two float values are equal when the significant with 7 digits are identical, e.g. 1234567 is equal 1.234567E6 and so are 1.2345678 and 1.234567E0.

- R:NC:ALL:NA:serialization

The profiles are defined in the EnterpriseArchitect application and have multiple artifacts that describe them. The main artifacts are:

1) the EAP file (EnterpriseArchitect project file),
2) the profiles’ specification document and

3) the application profiles (RDFS and SHACL).

Due to the complexity of the profiles, there are various cross profile associations that, from profiling and profile maintenance point of view, it is not practical to include the complete inheritance structure in all profiles. If this is done the documentation provided for all profiles would also include duplicated information on the description of classes defined in other profiles. The following cases are often observed in profiles:

- Case 1: An association end refers to an abstract class
- Case 2: An abstract class (stereotyped with “Description”) has an association (direction to another class)
- Case 3: An abstract class (not stereotyped with “Description”) has an association (direction to another class)
- Case 4: An abstract class has attributes and subclasses are not in the profile

In all cases, the datasets shall only include the subtypes of the abstract classes with the related properties (i.e. association or attributes) defined in the profile. The information is taken from either canonical model or the profiles where complete (expected) inheritance structure for the related abstract class is described. SHACL based constraints include constraints only for the concrete classes that are subtypes of the abstract class in the profile, and this can be used to inform which are the concrete classes expected in a dataset that conforms to this profile.

It should be taken into account that this approach deviates from MVAL5 (IEC 61970-600-1:2021), which creates multiple inheritance at serialization. For instance, with this more explicit exchange the serialization of the association between abstract class Equipment and abstract class Circuit for a PowerTransformer will be serialized as follows:

- for association

```
<cim:PowerTransformer rdf:about="_c328f787-bc17-47ad-a59f-6ba7133340d0">
  <nc:Equipment.Circut rdf:resource="#_9ced16ac-d076-4ef9-a241-a998a579e77b"/>
</cim:PowerTransformer>
```

- for attribute

```
<cim:ACLineSegment rdf:about="_04f681aa-6999-4fb3-9775-acaa5eb7ceff">
  <cim:Equipment.inService>true</cim:Equipment.inService>
</cim:ACLineSegment>
```

The usage of rdf:ID or rdf:about depends on the stereotype of the class. rdf:about is used if the class has the stereotype “Description”.

An example of not allowed serialization, as the Equipment is an abstract class

```
<cim:Equipment rdf:about="_c328f787-bc17-47ad-a59f-6ba7133340d0">
  <nc:Equipment.Circut rdf:resource="#_9ced16ac-d076-4ef9-a241-a998a579e77b"/>
</cim:Equipment>
```

2.4 Metadata

ENTSO-E agreed to extend the header and metadata definitions by IEC 61970-552 Ed2. This new header definitions rely on W3C recommendations which are used worldwide and are

positively recognised by the European Commission. The new definitions of the header mainly use Provenance ontology (PROV-O), Time Ontology and Data Catalog Vocabulary (DCAT). The global new header applicable for this profile is included in the metadata and document header specification document.

The header vocabulary contains all attributes defined in IEC 61970-552. This is done only for the purpose of having one vocabulary for header and to ensure transition for data exchanges that are using IEC 61970-552:2016 header. This profile does not use IEC 61970-552:2016 header attributes and relies only on the extended attributes.

2.4.1 Constraints

The identification of the constraints related to the metadata follows the same convention for naming of the constraints as for profile constraints.

- R:NC:ALL:wasAttributedTo:usage

  The prov:wasAttributedTo should normally be the “X” EIC code of the actor or their URI (prov:Agent).

2.4.2 Reference metadata

The header defined for this profile requires availability of a set of reference metadata. For instance, the attribute prov:wasGeneratedBy requires a reference to an activity which produced the model or the related process. The activities are defined as reference metadata and their identifiers are referenced from the header to enable the receiving entity to retrieve the “static” (reference) information that is not modified frequently. This approach imposes a requirement that both the sending entity and the receiving entity have access to a unique version of the reference metadata. Therefore, each business process shall define which reference metadata is used and where it is located.

3 Detailed Profile Specification

3.1 General

This package contains steady state instruction profile.

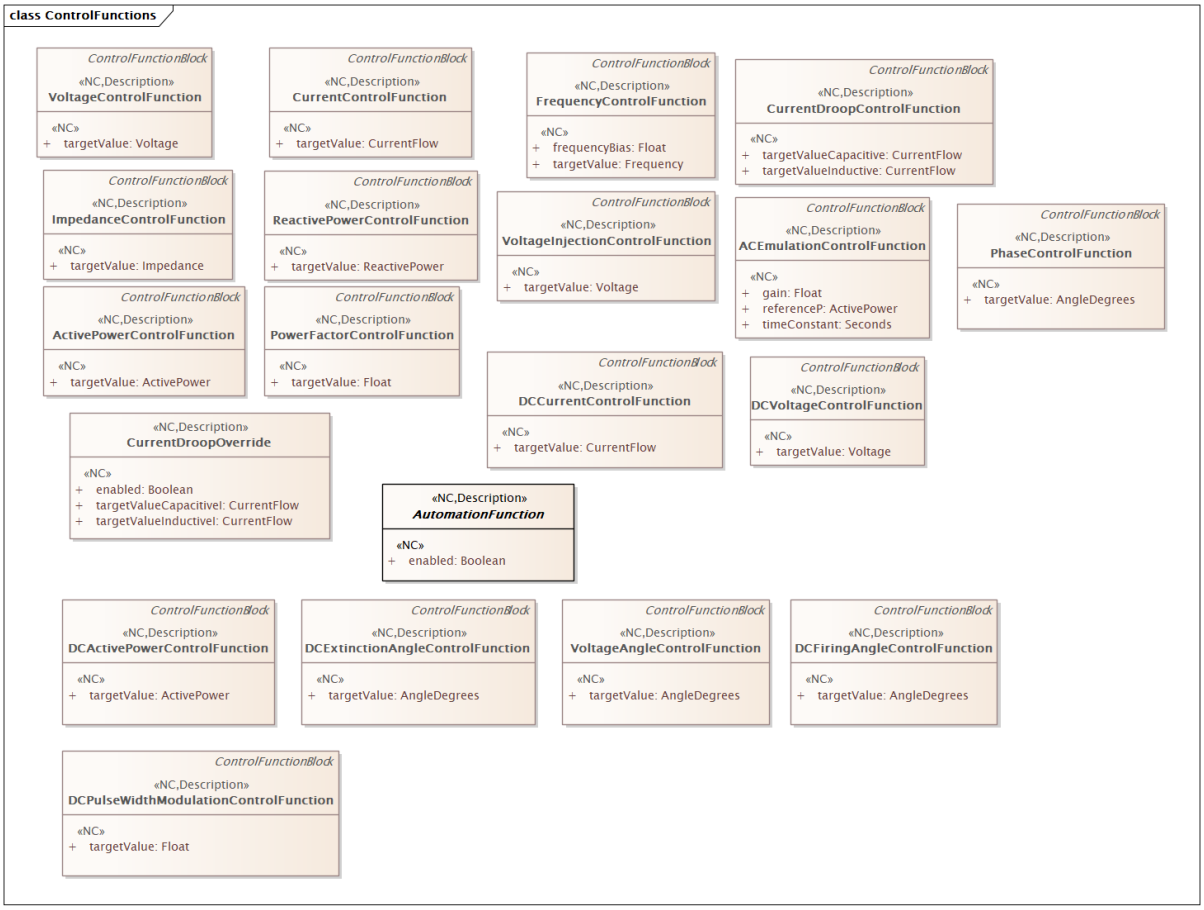

Figure 1 – Class diagram SteadyStateInstructionProfile::ControlFunctions

Figure 1:

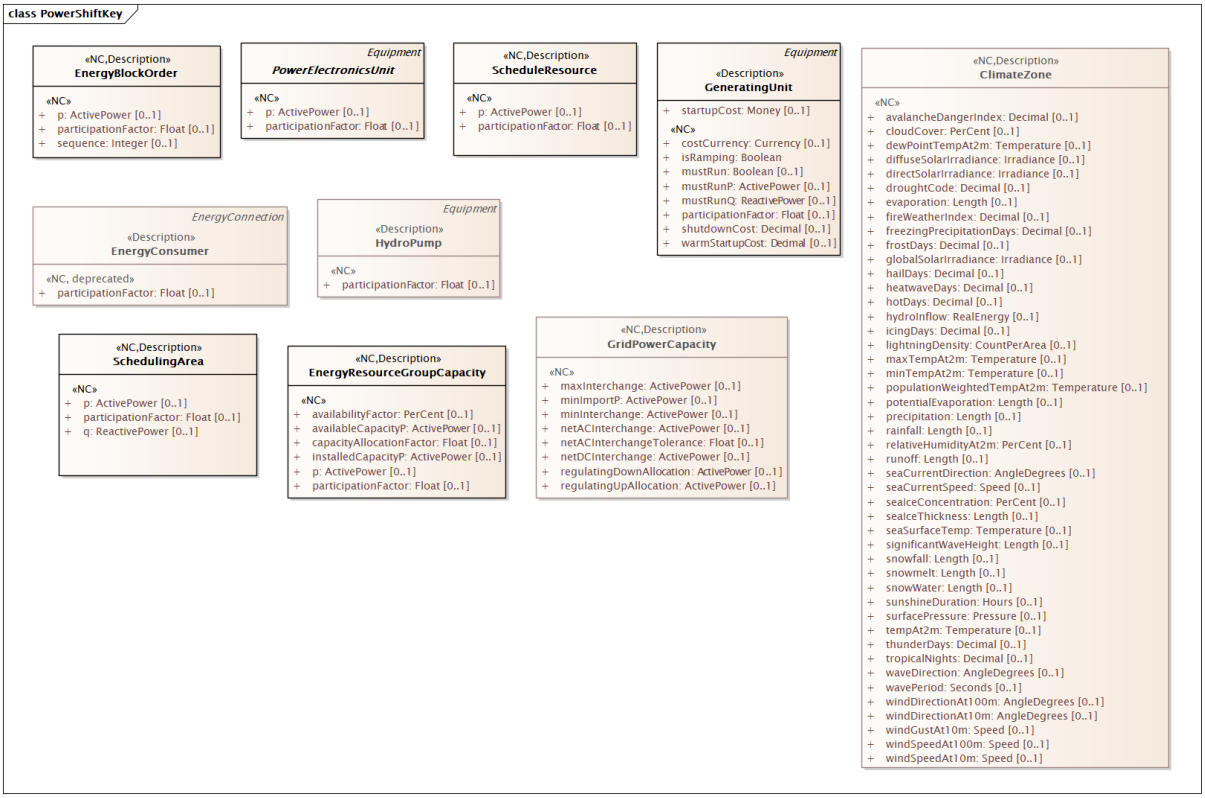

Figure 2 – Class diagram SteadyStateInstructionProfile::PowerShiftKey

Figure 2: The diagram shows generation and load shift keys related classes.

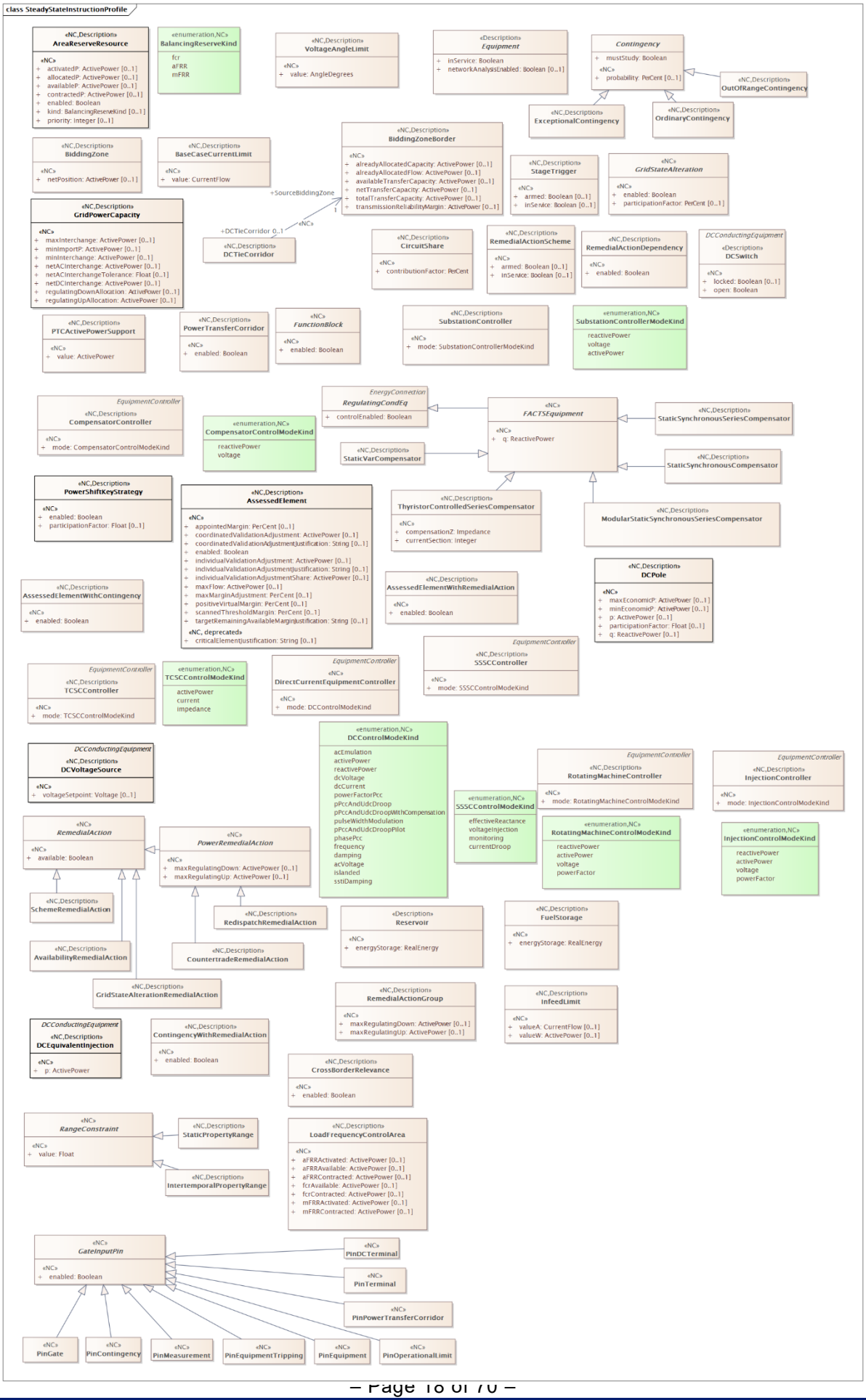
class SteadyStateInstructionProfile
AreaReserveResource
activatedP: ActivePower [0..1]
allocatedP: ActivePower [0..1]
availableP: ActivePower [0..1]
contractedP: ActivePower [0..1]
enabled: Boolean
kind: BalancingReserveKind [0..1]
priority: Integer [0..1]
BalancingReserveKind
fcr
aFRR
mFRR
VoltageAngleLimit
value: AngleDegrees
Equipment
inService: Boolean
networkAnalysisEnabled: Boolean [0..1]
Contingency
mustStudy: Boolean
probability: PerCent [0..1]
OutOfRangeContingency
ExceptionalContingency
OrdinaryContingency
BiddingZone
netPosition: ActivePower [0..1]
BaseCaseCurrentLimit
value: CurrentFlow
BiddingZoneBorder
alreadyAllocatedCapacity: ActivePower [0..1]
alreadyAllocatedFlow: ActivePower [0..1]
availableTransferCapacity: ActivePower [0..1]
netTransferCapacity: ActivePower [0..1]
totalTransferCapacity: ActivePower [0..1]
transmissionReliabilityMargin: ActivePower [0..1]
+SourceBiddingZone
StageTrigger
armed: Boolean [0..1]
inService: Boolean [0..1]
GridStateAlteration
enabled: Boolean
participationFactor: PerCent [0..1]
GridPowerCapacity
maxInterchange: ActivePower [0..1]
minImportP: ActivePower [0..1]
minInterchange: ActivePower [0..1]
netACInterchange: ActivePower [0..1]
netACInterchangeTolerance: Float [0..1]
netDCInterchange: ActivePower [0..1]
regulatingDownAllocation: ActivePower [0..1]
regulatingUpAllocation: ActivePower [0..1]
+DCTieCorridor 0..1
DCTieCorridor
CircuitShare
contributionFactor: PerCent
RemedialActionScheme
armed: Boolean [0..1]
inService: Boolean [0..1]
RemedialActionDependency
enabled: Boolean
DCConductingEquipment
DCSwitch
locked: Boolean [0..1]
open: Boolean
PTCActivePowerSupport
value: ActivePower
PowerTransferCorridor
enabled: Boolean
FunctionBlock
enabled: Boolean
SubstationController
mode: SubstationControllerModeKind
SubstationControllerModeKind
reactivePower
voltage
activePower
EquipmentController
CompensatorController
mode: CompensatorControlModeKind
CompensatorControlModeKind
reactivePower
voltage
EnergyConnection
RegulatingCondEq
controlEnabled: Boolean
FACTSEquipment
q: ReactivePower
StaticSynchronousSeriesCompensator
StaticVarCompensator
StaticSynchronousCompensator
PowerShiftKeyStrategy
enabled: Boolean
participationFactor: Float [0..1]
AssessedElement
appointedMargin: PerCent [0..1]
coordinatedValidationAdjustment: ActivePower [0..1]
coordinatedValidationAdjustmentJustification: String [0..1]
enabled: Boolean
individualValidationAdjustment: ActivePower [0..1]
individualValidationAdjustmentJustification: String [0..1]
individualValidationAdjustmentShare: ActivePower [0..1]
maxFlow: ActivePower [0..1]
maxMarginAdjustment: PerCent [0..1]
positiveVirtualMargin: PerCent [0..1]
scannedThresholdMargin: PerCent [0..1]
targetRemainingAvailableMarginJustification: String [0..1]
«deprecated»
criticalElementJustification: String [0..1]
ThyristorControlledSeriesCompensator
compensationZ: Impedance
currentSection: Integer
ModularStaticSynchronousSeriesCompensator
AssessedElementWithContingency
enabled: Boolean
AssessedElementWithRemedialAction
enabled: Boolean
DCPole
maxEconomicP: ActivePower [0..1]
minEconomicP: ActivePower [0..1]
p: ActivePower [0..1]
participationFactor: Float [0..1]
q: ReactivePower [0..1]
SSSCController
mode: SSSCControlModeKind
TCSCController
mode: TCSCControlModeKind
TCSCControlModeKind
activePower
current
impedance
DirectCurrentEquipmentController
mode: DCControlModeKind
DCControlModeKind
acEmulation
activePower
reactivePower
dcVoltage
dcCurrent
powerFactorPcc
pPccAndUdcDroop
pPccAndUdcDroopWithCompensation
pulseWidthModulation
pPccAndUdcDroopPilot
phasePcc
frequency
damping
acVoltage
islanded
sstiDamping
SSSCControlModeKind
effectiveReactance
voltageInjection
monitoring
currentDroop
RotatingMachineController
mode: RotatingMachineControlModeKind
RotatingMachineControlModeKind
reactivePower
activePower
voltage
powerFactor
InjectionController
mode: InjectionControlModeKind
InjectionControlModeKind
reactivePower
activePower
voltage
powerFactor
DCVoltageSource
voltageSetpoint: Voltage [0..1]
RemedialAction
available: Boolean
PowerRemedialAction
maxRegulatingDown: ActivePower [0..1]
maxRegulatingUp: ActivePower [0..1]
SchemeRemedialAction
RedispatchRemedialAction
AvailabilityRemedialAction
CountertradeRemedialAction
Reservoir
energyStorage: RealEnergy
FuelStorage
energyStorage: RealEnergy
GridStateAlterationRemedialAction
RemedialActionGroup
maxRegulatingDown: ActivePower [0..1]
maxRegulatingUp: ActivePower [0..1]
InfeedLimit
valueA: CurrentFlow [0..1]
valueW: ActivePower [0..1]
DCEquivalentInjection
p: ActivePower
ContingencyWithRemedialAction
enabled: Boolean
CrossBorderRelevance
enabled: Boolean
RangeConstraint
value: Float
StaticPropertyRange
IntertemporalPropertyRange
LoadFrequencyControlArea
aFRRActivated: ActivePower [0..1]
aFRRAvailable: ActivePower [0..1]
aFRRContracted: ActivePower [0..1]
fcrAvailable: ActivePower [0..1]
fcrContracted: ActivePower [0..1]
mFRRActivated: ActivePower [0..1]
mFRRContracted: ActivePower [0..1]
GateInputPin
enabled: Boolean
PinDCTerminal
PinTerminal
PinPowerTransferCorridor
PinGate
PinContingency
PinMeasurement
PinEquipmentTripping
PinEquipment
PinOperationalLimit

Figure 3 – Class diagram SteadyStateInstructionProfile::SteadyStateInstructionProfile

Figure 3: The diagram shows steady state instruction related classes.

3.2 (abstract) Contingency root class

An event threatening system reliability, consisting of one or more contingency elements.
Table 1 shows all attributes of Contingency.

Table 1 – Attributes of SteadyStateInstructionProfile::Contingency

name	mult	type	description
mustStudy	1..1	Boolean	Set true if must study this contingency.
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].

3.3 (abstract) PowerElectronicsUnit

Inheritance path = Equipment
A generating unit or battery or aggregation that connects to the AC network using power electronics rather than rotating machines.
Table 2 shows all attributes of PowerElectronicsUnit.

Table 2 – Attributes of SteadyStateInstructionProfile::PowerElectronicsUnit

name	mult	type	description
p	0..1	ActivePower	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for a steady state solution.
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.
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.4 (abstract) RegulatingCondEq

Inheritance path = Equipment
A type of conducting equipment that can regulate a quantity (i.e. voltage or flow) at a specific point in the network.
Table 3 shows all attributes of RegulatingCondEq.

547 **Table 3 – Attributes of SteadyStateInstructionProfile::RegulatingCondEq**

name	mult	type	description
controlEnabled	1..1	Boolean	Specifies the regulation status of the equipment. True is regulating, false is not regulating.
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

548

549 ### 3.5 (NC) BalancingReserveKind enumeration

550 Classification of the balancing reserve product represented by an AreaReserveResource. The
551 kind identifies the reserve service for which the associated resource has been qualified and
552 made available.
553 Table 4 shows all literals of BalancingReserveKind.

554 **Table 4 – Literals of SteadyStateInstructionProfile::BalancingReserveKind**

literal	value	description
fcr		Frequency Containment Reserve (FCR). Automatically activated reserve that provides immediate frequency containment following small frequency deviations or disturbances.
aFRR		Automatic Frequency Restoration Reserve (aFRR). Automatically activated balancing reserve used to restore system frequency and scheduled interchanges under automatic generation control (AGC).
mFRR		Manual Frequency Restoration Reserve (mFRR). Manually activated balancing reserve used to restore system balance following activation by the system operator.

555

556 ### 3.6 (NC) CompensatorControlModeKind enumeration

557 Kind of compensator controller mode.
558 Table 5 shows all literals of CompensatorControlModeKind.

559 **Table 5 – Literals of SteadyStateInstructionProfile::CompensatorControlModeKind**

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

560

561 ### 3.7 Currency enumeration

562 Monetary currencies. ISO 4217 standard including 3-character currency code.
563 Table 6 shows all literals of Currency.

564 **Table 6 – Literals of SteadyStateInstructionProfile::Currency**

literal	value	description
AED		United Arab Emirates dirham.
AFN		Afghan afghani.
ALL		Albanian lek.
AMD		Armenian dram.
ANG		Netherlands Antillean guilder.

literal	value	description
AOA		Angolan kwanza.
ARS		Argentine peso.
AUD		Australian dollar.
AWG		Aruban florin.
AZN		Azerbaijani manat.
BAM		Bosnia and Herzegovina convertible mark.
BBD		Barbados dollar.
BDT		Bangladeshi taka.
BGN		Bulgarian lev.
BHD		Bahraini dinar.
BIF		Burundian franc.
BMD		Bermudian dollar (customarily known as Bermuda dollar).
BND		Brunei dollar.
BOB		Boliviano.
BOV		Bolivian Mvdol (funds code).
BRL		Brazilian real.
BSD		Bahamian dollar.
BTN		Bhutanese ngultrum.
BWP		Botswana pula.
BYR		Belarusian ruble.
BZD		Belize dollar.
CAD		Canadian dollar.
CDF		Congolese franc.
CHF		Swiss franc.
CLF		Unidad de Fomento (funds code), Chile.
CLP		Chilean peso.
CNY		Chinese yuan.
COP		Colombian peso.
COU		Unidad de Valor Real.
CRC		Costa Rican colon.
CUC		Cuban convertible peso.
CUP		Cuban peso.
CVE		Cape Verde escudo.
CZK		Czech koruna.
DJF		Djiboutian franc.
DKK		Danish krone.
DOP		Dominican peso.
DZD		Algerian dinar.
EEK		Estonian kroon.
EGP		Egyptian pound.

literal	value	description
ERN		Eritrean nakfa.
ETB		Ethiopian birr.
EUR		Euro.
FJD		Fiji dollar.
FKP		Falkland Islands pound.
GBP		Pound sterling.
GEL		Georgian lari.
GHS		Ghanaian cedi.
GIP		Gibraltar pound.
GMD		Gambian dalasi.
GNF		Guinean franc.
GTQ		Guatemalan quetzal.
GYD		Guyanese dollar.
HKD		Hong Kong dollar.
HNL		Honduran lempira.
HRK		Croatian kuna.
HTG		Haitian gourde.
HUF		Hungarian forint.
IDR		Indonesian rupiah.
ILS		Israeli new sheqel.
INR		Indian rupee.
IQD		Iraqi dinar.
IRR		Iranian rial.
ISK		Icelandic króna.
JMD		Jamaican dollar.
JOD		Jordanian dinar.
JPY		Japanese yen.
KES		Kenyan shilling.
KGS		Kyrgyzstani som.
KHR		Cambodian riel.
KMF		Comoro franc.
KPW		North Korean won.
KRW		South Korean won.
KWD		Kuwaiti dinar.
KYD		Cayman Islands dollar.
KZT		Kazakhstani tenge.
LAK		Lao kip.
LBP		Lebanese pound.
LKR		Sri Lanka rupee.
LRD		Liberian dollar.
LSL		Lesotho loti.

literal	value	description
LTL		Lithuanian litas.
LVL		Latvian lats.
LYD		Libyan dinar.
MAD		Moroccan dirham.
MDL		Moldovan leu.
MGA		Malagasy ariary.
MKD		Macedonian denar.
MMK		Myanma kyat.
MNT		Mongolian tugrik.
MOP		Macanese pataca.
MRO		Mauritanian ouguiya.
MUR		Mauritian rupee.
MVR		Maldivian rufiyaa.
MWK		Malawian kwacha.
MXN		Mexican peso.
MYR		Malaysian ringgit.
MZN		Mozambican metical.
NAD		Namibian dollar.
NGN		Nigerian naira.
NIO		Cordoba oro.
NOK		Norwegian krone.
NPR		Nepalese rupee.
NZD		New Zealand dollar.
OMR		Omani rial.
PAB		Panamanian balboa.
PEN		Peruvian nuevo sol.
PGK		Papua New Guinean kina.
PHP		Philippine peso.
PKR		Pakistani rupee.
PLN		Polish zloty.
PYG		Paraguayan guaraní.
QAR		Qatari rial.
RON		Romanian new leu.
RSD		Serbian dinar.
RUB		Russian rouble.
RWF		Rwandan franc.
SAR		Saudi riyal.
SBD		Solomon Islands dollar.
SCR		Seychelles rupee.
SDG		Sudanese pound.
SEK		Swedish krona/kronor.

literal	value	description
SGD		Singapore dollar.
SHP		Saint Helena pound.
SLL		Sierra Leonean leone.
SOS		Somali shilling.
SRD		Surinamese dollar.
STD		São Tomé and Príncipe dobra.
SYP		Syrian pound.
SZL		Lilangeni.
THB		Thai baht.
TJS		Tajikistani somoni.
TMT		Turkmenistani manat.
TND		Tunisian dinar.
TOP		Tongan pa'anga.
TRY		Turkish lira.
TTD		Trinidad and Tobago dollar.
TWD		New Taiwan dollar.
TZS		Tanzanian shilling.
UAH		Ukrainian hryvnia.
UGX		Ugandan shilling.
USD		United States dollar.
UYU		Uruguayan peso.
UZS		Uzbekistan som.
VEF		Venezuelan bolívar fuerte.
VND		Vietnamese Dong.
VUV		Vanuatu vatu.
WST		Samoan tala.
XAF		CFA franc BEAC.
XCD		East Caribbean dollar.
XOF		CFA Franc BCEAO.
XPF		CFP franc.
YER		Yemeni rial.
ZAR		South African rand.
ZMK		Zambian kwacha.
ZWL		Zimbabwe dollar.

565

566 ### 3.8 (NC) DCControlModeKind enumeration

567 Kind of DC control mode.
568 Table 7 shows all literals of DCControlModeKind.

569 **Table 7 – Literals of SteadyStateInstructionProfile::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 DC 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 DC system (at the AC points of common coupling of the DC system). In practice, the angle difference is measured by built-in devices in the converters and the synchronization of angle measurements on both stations is done by means of GPS. ACEmulationControlFunction is used by this control. The control can only be applied by a controller that have access to the two AC points of common coupling of the DC system. Therefore it cannot be applied for a ACDCConverterController.
activePower		Control is active power control at AC side, at point of common coupling. According to IEC 60633 the active power control mode is control of the active power flow exchanged between a DC substation and the connected AC network.
reactivePower		Control is reactive power control at AC side, at point of common coupling. According to IEC 60633 reactive power control mode is a control of the reactive power exchanged between a converter unit, or DC substation and the connected AC network.
dcVoltage		Control is DC voltage in a DC substation (IEC 60633).
dcCurrent		Control is DC current in a DC system (IEC 60633).
powerFactorPcc		Control is power factor at point of common coupling.
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.
pulseWidthModulation		No explicit control. Pulse-modulation factor is directly set in magnitude and phase.
pPccAndUdcDroopPilot		Control is active power at point of common coupling and the pilot DC voltage, with the droop. The mode is used for Multi Terminal High Voltage DC (MTDC) systems where multiple DC Substations are connected to the DC transmission lines. The pilot voltage is then used to coordinate the control the DC voltage across the DC substations.
phasePcc		Control is phase at point of common coupling.
frequency		Frequency control mode (IEC 60633) is a control of the frequency of the connected AC network by

literal	value	description
		varying the active power exchanged between a DC substation and the connected AC network.
damping		Damping control mode (IEC 60633) is supplementary control mode providing the damping of power oscillations in one or more connected AC networks.
acVoltage		AC voltage control mode (IEC 60633) is a control of the AC voltage of the AC network connected to a DC substation.
islanded		Islanded network operation mode (IEC 60633) is a control mode in which the DC substation is connected to an islanded AC network.
sstiDamping		Sub-synchronous torsional interaction (SSTI) damping control mode (IEC 60633) is a supplementary control mode providing the damping of critical frequencies of an (electrical) nearby generator.

570

571 ### 3.9 (NC) InjectionControlModeKind enumeration

572 Kind of injection controller mode.
573 Table 8 shows all literals of InjectionControlModeKind.

574 **Table 8 – Literals of SteadyStateInstructionProfile::InjectionControlModeKind**

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

575

576 ### 3.10 (NC) RotatingMachineControlModeKind enumeration

577 Kind of rotating machine controller mode.
578 Table 9 shows all literals of RotatingMachineControlModeKind.

579 **Table 9 – Literals of SteadyStateInstructionProfile::RotatingMachineControlModeKind**

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

580

581 ### 3.11 (NC) SSSCControlModeKind enumeration

582 Control modes of the Static Synchronous Series Compensator (SSSC).
583 Table 10 shows all literals of SSSCControlModeKind.

584 **Table 10 – Literals of SteadyStateInstructionProfile::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

literal	value	description
		voltage will vary according to the line current level.
voltageInjection		The device injects a fixed voltage that is either inductive or capacitive according to the specified target value of the VoltageInjectionControlFunction. The effective reactance varies according to the flow of the line current.
monitoring		The device bypasses and a voltage injection is close to zero. In monitoring mode current is monitored.
currentDroop		The device injects a voltage proportional to the difference between the line current and the target value of the CurrentDroopControlFunction. There are capacitive and inductive operational regions.

3.12 (NC) SubstationControllerModeKind enumeration

Kind of substation controller mode.
Table 11 shows all literals of SubstationControllerModeKind.

Table 11 – Literals of SteadyStateInstructionProfile::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..

3.13 (NC) TCSCControlModeKind enumeration

Kind of TCSC control mode.
Table 12 shows all literals of TCSCControlModeKind.

Table 12 – Literals of SteadyStateInstructionProfile::TCSCControlModeKind

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

3.14 UnitMultiplier enumeration

The unit multipliers defined for the CIM. When applied to unit symbols, the unit symbol is treated as a derived unit. Regardless of the contents of the unit symbol text, the unit symbol shall be treated as if it were a single-character unit symbol. Unit symbols should not contain multipliers, and it should be left to the multiplier to define the multiple for an entire data type.
For example, if a unit symbol is "m2Pers" and the multiplier is "k", then the value is k(m**2/s), and the multiplier applies to the entire final value, not to any individual part of the value. This can be conceptualized by substituting a derived unit symbol for the unit type. If one imagines that the symbol "Þ" represents the derived unit "m2Pers", then applying the multiplier "k" can be conceptualized simply as "kÞ".
For example, the SI unit for mass is "kg" and not "g". If the unit symbol is defined as "kg", then the multiplier is applied to "kg" as a whole and does not replace the "k" in front of the "g". In

this case, the multiplier of "m" would be used with the unit symbol of "kg" to represent one gram. As a text string, this violates the instructions in IEC 80000-1. However, because the unit symbol in CIM is treated as a derived unit instead of as an SI unit, it makes more sense to conceptualize the "kg" as if it were replaced by one of the proposed replacements for the SI mass symbol. If one imagines that the "kg" were replaced by a symbol "Þ", then it is easier to conceptualize the multiplier "m" as creating the proper unit "mÞ", and not the forbidden unit "mkg".
Table 13 shows all literals of UnitMultiplier.

Table 13 – Literals of SteadyStateInstructionProfile::UnitMultiplier

literal	value	description
none		No multiplier or equivalently multiply by 1.
k		Kilo 10**3.
M		Mega 10**6.

3.15 UnitSymbol enumeration

The derived units defined for usage in the CIM. In some cases, the derived unit is equal to an SI unit. Whenever possible, the standard derived symbol is used instead of the formula for the derived unit. For example, the unit symbol Farad is defined as "F" instead of "CPerV". In cases where a standard symbol does not exist for a derived unit, the formula for the unit is used as the unit symbol. For example, density does not have a standard symbol and so it is represented as "kgPerm3". With the exception of the "kg", which is an SI unit, the unit symbols do not contain multipliers and therefore represent the base derived unit to which a multiplier can be applied as a whole.
Every unit symbol is treated as an unparseable text as if it were a single-letter symbol. The meaning of each unit symbol is defined by the accompanying descriptive text and not by the text contents of the unit symbol.
To allow the widest possible range of serializations without requiring special character handling, several substitutions are made which deviate from the format described in IEC 80000-1. The division symbol "/" is replaced by the letters "Per". Exponents are written in plain text after the unit as "m3" instead of being formatted as "m" with a superscript of 3 or introducing a symbol as in "m^3". The degree symbol "°" is replaced with the letters "deg". Any clarification of the meaning for a substitution is included in the description for the unit symbol.
Non-SI units are included in list of unit symbols to allow sources of data to be correctly labelled with their non-SI units (for example, a GPS sensor that is reporting numbers that represent feet instead of meters). This allows software to use the unit symbol information correctly convert and scale the raw data of those sources into SI-based units.
The integer values are used for harmonization with IEC 61850.
Table 14 shows all literals of UnitSymbol.

Table 14 – Literals of SteadyStateInstructionProfile::UnitSymbol

literal	value	description
none		Dimension less quantity, e.g. count, per unit, etc.
s		Time in seconds.
A		Current in amperes.
deg		Plane angle in degrees.
V		Electric potential in volts (W/A).
ohm		Electric resistance in ohms (V/A).
Hz		Frequency in hertz (1/s).
W		Real power in watts (J/s). Electrical power may have real and reactive components. The real portion of electrical power (I^2R or VIcos(phi)), is

literal	value	description
		expressed in Watts. See also apparent power and reactive power.
VAr		Reactive power in volt amperes reactive. The “reactive” or “imaginary” component of electrical power (VIsin(phi)). (See also real power and apparent power). Note: Different meter designs use different methods to arrive at their results. Some meters may compute reactive power as an arithmetic value, while others compute the value vectorially. The data consumer should determine the method in use and the suitability of the measurement for the intended purpose.
Wh		Real energy in watt hours.

3.16 ActivePower datatype

Product of RMS value of the voltage and the RMS value of the in-phase component of the current.
Table 15 shows all attributes of ActivePower.

Table 15 – Attributes of SteadyStateInstructionProfile::ActivePower

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	
value	0..1	Float	

3.17 AngleDegrees datatype

Measurement of angle in degrees.
Table 16 shows all attributes of AngleDegrees.

Table 16 – Attributes of SteadyStateInstructionProfile::AngleDegrees

name	mult	type	description
value	0..1	Float	
unit	0..1	UnitSymbol	
multiplier	0..1	UnitMultiplier	

3.18 CurrentFlow datatype

Electrical current with sign convention: positive flow is out of the conducting equipment into the connectivity node. Can be both AC and DC.
Table 17 shows all attributes of CurrentFlow.

Table 17 – Attributes of SteadyStateInstructionProfile::CurrentFlow

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	
value	0..1	Float	

3.19 Frequency datatype

Cycles per second.
Table 18 shows all attributes of Frequency.

Table 18 – Attributes of SteadyStateInstructionProfile::Frequency

name	mult	type	description
value	0..1	Float	
unit	0..1	UnitSymbol	
multiplier	0..1	UnitMultiplier	

3.20 Hours datatype

Time specified in hours.
Table 19 shows all attributes of Hours.

Table 19 – Attributes of SteadyStateInstructionProfile::Hours

name	mult	type	description
value	0..1	Float	
unit	0..1	UnitSymbol	
multiplier	0..1	UnitMultiplier	

3.21 Impedance datatype

Ratio of voltage to current.
Table 20 shows all attributes of Impedance.

Table 20 – Attributes of SteadyStateInstructionProfile::Impedance

name	mult	type	description
value	0..1	Float	
unit	0..1	UnitSymbol	
multiplier	0..1	UnitMultiplier	

3.22 Length datatype

Unit of length. It shall be a positive value or zero.
Table 21 shows all attributes of Length.

Table 21 – Attributes of SteadyStateInstructionProfile::Length

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	
value	0..1	Float	

3.23 Money datatype

Amount of money.
Table 22 shows all attributes of Money.

683 **Table 22 – Attributes of SteadyStateInstructionProfile::Money**

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	Currency	
value	0..1	Decimal	

684

685 ### 3.24 PerCent datatype

686 Percentage on a defined base. For example, specify as 100 to indicate at the defined base.
687 Table 23 shows all attributes of PerCent.

688 **Table 23 – Attributes of SteadyStateInstructionProfile::PerCent**

name	mult	type	description
value	0..1	Float	Normally 0 to 100 on a defined base.
unit	0..1	UnitSymbol	
multiplier	0..1	UnitMultiplier	

689

690 ### 3.25 Pressure datatype

691 Pressure in pascals.
692 Table 24 shows all attributes of Pressure.

693 **Table 24 – Attributes of SteadyStateInstructionProfile::Pressure**

name	mult	type	description
value	0..1	Float	
unit	0..1	UnitSymbol	
multiplier	0..1	UnitMultiplier	

694

695 ### 3.26 ReactivePower datatype

696 Product of RMS value of the voltage and the RMS value of the quadrature component of the
697 current.
698 Table 25 shows all attributes of ReactivePower.

699 **Table 25 – Attributes of SteadyStateInstructionProfile::ReactivePower**

name	mult	type	description
value	0..1	Float	
unit	0..1	UnitSymbol	
multiplier	0..1	UnitMultiplier	

700

701 ### 3.27 RealEnergy datatype

702 Real electrical energy.
703 Table 26 shows all attributes of RealEnergy.

704 **Table 26 – Attributes of SteadyStateInstructionProfile::RealEnergy**

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	

name	mult	type	description
value	0..1	Float	

705

706 ### 3.28 Seconds datatype

707 Time, in seconds.
708 Table 27 shows all attributes of Seconds.

709 **Table 27 – Attributes of SteadyStateInstructionProfile::Seconds**

name	mult	type	description
value	0..1	Float	Time, in seconds
unit	0..1	UnitSymbol	
multiplier	0..1	UnitMultiplier	

710

711 ### 3.29 Speed datatype

712 Distance per unit of time.
713 Table 28 shows all attributes of Speed.

714 **Table 28 – Attributes of SteadyStateInstructionProfile::Speed**

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	
value	0..1	Float	

715

716 ### 3.30 Temperature datatype

717 Value of temperature in degrees Celsius.
718 Table 29 shows all attributes of Temperature.

719 **Table 29 – Attributes of SteadyStateInstructionProfile::Temperature**

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	
value	0..1	Float	

720

721 ### 3.31 Voltage datatype

722 Electrical voltage, can be both AC and DC.
723 Table 30 shows all attributes of Voltage.

724 **Table 30 – Attributes of SteadyStateInstructionProfile::Voltage**

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	
value	0..1	Float	

725

726 ### 3.32 Boolean primitive

727 A type with the value space "true" and "false".

3.33 Decimal primitive

Decimal is the base-10 notational system for representing real numbers.

3.34 Duration primitive

Duration as "PnYnMnDTnHnMnS" which conforms to ISO 8601, where nY expresses a number of years, nM a number of months, nD a number of days. The letter T separates the date expression from the time expression and, after it, nH identifies a number of hours, nM a number of minutes and nS a number of seconds. The number of seconds could be expressed as a decimal number, but all other numbers are integers.

3.35 Float primitive

A floating point number. The range is unspecified and not limited.

3.36 Integer primitive

An integer number. The range is unspecified and not limited.

3.37 String primitive

A string consisting of a sequence of characters. The character encoding is UTF-8. The string length is unspecified and unlimited.

3.38 (NC,Description) ACEmulationControlFunction

Inheritance path = FunctionBlock

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

The setpoint of the DC system is calculated by Psetpoint=Pref+Kdc*(angle1-angle2), where

- Pref is the existing active power setpoint;
- Kdc is the control system gain and
- angle1 and angle2 are the phase angle measurement (measured at points of common coupling with the AC network) respectively at the side 1 and 2 of the DC system.

Table 31 shows all attributes of ACEmulationControlFunction.

Table 31 – Attributes of SteadyStateInstructionProfile::ACEmulationControlFunction

name	mult	type	description
referenceP	1..1	ActivePower	(NC) Existing active power setpoint used to calculate the active power setpoint of the AC emulation control.
gain	1..1	Float	(NC) Control system gain in AC transmission emulation control measured in MW/deg. It plays the role of an admittance of the equivalent AC transmission line that the control is emulating the higher is the gain the higher is the active power transfer at steady state.
timeConstant	1..1	Seconds	(NC) Control system time constant in AC transmission emulation control. It affects the time needed to reach a new steady state equilibrium point after a network perturbation extremely important to guarantee N-1 relief related to an interconnection. The higher is time constant the slower is the DC system dynamic.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.39 (NC,Description) ActivePowerControlFunction

Inheritance path = FunctionBlock
Active power control function is a function block that calculates operating point of the controlled equipment to achieve the target active power.
Table 32 shows all attributes of ActivePowerControlFunction.

Table 32 – Attributes of SteadyStateInstructionProfile::ActivePowerControlFunction

name	mult	type	description
targetValue	1..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.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.40 (NC,Description) AreaReserveResource root class

A resource representation for a specific balancing reserve product, associated with either a scheduling area or a tie corridor, and used to represent reserve capability made available to a control area for market and operational purposes.
Note: An AreaReserveResource shall be associated with either a SchedulingArea or a TieCorridor, but not both.
When associated with a SchedulingArea, the resource represents reserve capability made available within that area context.
When associated with a TieCorridor, the resource represents reserve capability provided across an inter-area connection to support a control area other than the one in which the underlying resource is located.
A single physical or logical resource (for example a GeneratingUnit, HydroPump, PowerElectronicsUnit, or equivalent) may be represented by multiple AreaReserveResource instances, each corresponding to a different balancing reserve product (e.g. FCR, aFRR, mFRR).
Table 33 shows all attributes of AreaReserveResource.

Table 33 – Attributes of SteadyStateInstructionProfile::AreaReserveResource

name	mult	type	description
enabled	1..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.
activatedP	0..1	ActivePower	(NC) Amount of active power currently activated for the reserve product.
allocatedP	0..1	ActivePower	(NC) Amount of active power capability allocated from the associated resource to the area for the given reserve product.
availableP	0..1	ActivePower	(NC) Amount of active power currently available for provision of the reserve product.
contractedP	0..1	ActivePower	(NC) Amount of active power contracted for the reserve product.
priority	0..1	Integer	(NC) Relative priority for activation or selection within an area or aggregated reserve structure.
kind	0..1	BalancingReserveKind	(NC) Type of reserve product represented by the allocation.

3.41 (NC,Description) AssessedElement root class

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 34 shows all attributes of AssessedElement.

Table 34 – Attributes of SteadyStateInstructionProfile::AssessedElement

name	mult	type	description
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.
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].
enabled	1..1	Boolean	(NC) If true, the assessed element is enabled, otherwise it is disabled.
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].
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].
appointedMargin	0..1	PerCent	(NC) The percentage (appointed to a region) of the remaining margin obtained in the grid model to reach its current limit under normal operating conditions. The maximum percentage shall by default be 10% of the remaining margin. It is only used when an assessed element is considered conservative for a region. The allowed value range is [0,100].
individualValidationAdjustment	0..1	ActivePower	(NC) Positive value calculated and provided by System Operators from their individual validation process for the reduction of Remaining Available Margin (RAM) in order to ensure grid security.
coordinatedValidationAdjustment	0..1	ActivePower	(NC) Positive value calculated and provided by the Coordinated Capacity Calculator (CCC) for the reduction of Remaining Available Margin (RAM) in order to ensure grid security.
individualValidationAdjustmentShare	0..1	ActivePower	(NC) Positive value expressed calculated by the Coordinated Capacity Calculator (CCC) based on the provided Individual Validation Adjustment (IVA) by System Operators in order to show the actual reduction of Remaining Available Margin

name	mult	type	description
			(RAM). Individual Validation Adjustment Share is a positive non-zero value. It is equal or less than the Individual Validation Adjustment value.
individualValidationAdjustmentJustification	0..1	String	(NC) Free text description provided by System Operators for justifying the reduction of Remaining Available Margin (RAM) by means of Individual Validation Adjustment (IVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
coordinatedValidationAdjustmentJustification	0..1	String	(NC) Free text description provided by the coordinated capacity calculator (CCC) for justifying the reduction of Remaining Available Margin (RAM) by means of Coordinated Validation Adjustment (CVA). This justification is not intended for any application processing purpose, it should only be used for reporting.
criticalElementJustification	0..1	String	(deprecated,NC) Free text describing the justification of critical element categorization (e.g. the use of the kind). This justification is not intended for any application processing purpose, it should only be used for reporting.
targetRemainingAvailableMarginJustification	0..1	String	(NC) Free text describing the justification for the target Remaining Available Margin (RAM). This justification is not intended for any application processing purpose, it should only be used for reporting.

3.42 (NC,Description) AssessedElementWithContingency root class

Combination of an assessed element and a contingency.
Table 35 shows all attributes of AssessedElementWithContingency.

Table 35 – Attributes of SteadyStateInstructionProfile::AssessedElementWithContingency

name	mult	type	description
enabled	1..1	Boolean	(NC) If true, the assessed element with contingency is enabled, otherwise it is disabled.

3.43 (NC,Description) AssessedElementWithRemedialAction root class

Combination of an assessed element and a remedial action
Table 36 shows all attributes of AssessedElementWithRemedialAction.

Table 36 – Attributes of SteadyStateInstructionProfile::AssessedElementWithRemedialAction

name	mult	type	description
enabled	1..1	Boolean	(NC) If true, the assessed element with remedial action is enabled, otherwise it is disabled.

3.44 (abstract,NC,Description) AutomationFunction root class

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 37 shows all attributes of AutomationFunction.

Table 37 – Attributes of SteadyStateInstructionProfile::AutomationFunction

name	mult	type	description
enabled	1..1	Boolean	(NC) True, if the automation function is enabled (active). Otherwise false.

3.45 (NC,Description) AvailabilityRemedialAction

Inheritance path = RemedialAction
Availability remedial action is a remedial action that cancels or reschedules an availability schedule.
Table 38 shows all attributes of AvailabilityRemedialAction.

Table 38 – Attributes of SteadyStateInstructionProfile::AvailabilityRemedialAction

name	mult	type	description
available	1..1	Boolean	(NC) inherited from: RemedialAction

3.46 (NC,Description) BaseCaseCurrentLimit root class

Operational limit on current applicable for base case.
Table 39 shows all attributes of BaseCaseCurrentLimit.

Table 39 – Attributes of SteadyStateInstructionProfile::BaseCaseCurrentLimit

name	mult	type	description
value	1..1	CurrentFlow	(NC) Limit on current flow. The attribute shall be a positive value or zero.

3.47 (NC,Description) BiddingZone root class

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 40 shows all attributes of BiddingZone.

Table 40 – Attributes of SteadyStateInstructionProfile::BiddingZone

name	mult	type	description
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.

3.48 (NC,Description) BiddingZoneBorder root class

A unidirectional interface between two adjacent Bidding Zones, representing the available transmission capacity from the Bidding Zone defined by the association FromBiddingZone (source) to the Bidding Zone defined by the association ToBiddingZone (sink). It defines the capacity constraints and market-based allocation mechanisms for cross-zonal electricity exchange in the specified direction, considering potential transmission congestion and market price differences.
Table 41 shows all attributes of BiddingZoneBorder.

Table 41 – Attributes of SteadyStateInstructionProfile::BiddingZoneBorder

name	mult	type	description
totalTransferCapacity	0..1	ActivePower	(NC) Total Transfer Capacity (TTC) is the maximum exchange program between two areas

name	mult	type	description
			compatible with operational security standards applicable at each system if future network conditions, generation and load patterns were perfectly known in advance.
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.
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.

3.49 (NC,Description) CircuitShare root class

Defines the share of the circuit which is part of an associated power transfer corridor.
Table 42 shows all attributes of CircuitShare.

Table 42 – Attributes of SteadyStateInstructionProfile::CircuitShare

name	mult	type	description
contributionFactor	1..1	PerCent	(NC) Contribution factor for the circuit which is part of a power transfer corridor. The allowed value range is [0,100].

3.50 (NC,Description) ClimateZone root class

A geographically defined area characterised according to a climate classification and used as a spatial reference for representative meteorological, hydrological and marine conditions relevant to energy production, consumption and resource availability.
Note: ClimateZone provides selected climatological normal values as structured information and may reference time series for detailed climate, weather, hydrological and marine data. A normal value represents a climatological reference condition for the area. Time series may represent observed, historical, modelled, forecast, scenario or climatological data. Reference period, scenario, source, calculation method and other provenance information are represented separately.
ClimateZone may be used to associate energy resources and energy-system studies with climate-dependent conditions such as temperature, wind, solar irradiance, precipitation, snow, hydro inflow, extreme weather, waves, sea ice and sea currents.
Example: Climate study zones defined in the Pan-European Climate Database (PECD) for European energy-system modelling.
Table 43 shows all attributes of ClimateZone.

860 **Table 43 – Attributes of SteadyStateInstructionProfile::ClimateZone**

name	mult	type	description
avalancheDangerIndex	0..1	Decimal	(NC) An index representing the avalanche danger for the corresponding time interval. Note: The applicable avalanche danger methodology and classification are identified through the associated data provenance. The CIM model does not prescribe a particular avalanche danger scale. Where the index represents categorical danger levels, the numerical values shall not be assumed to form a linear scale. Example: Using the European Avalanche Danger Scale: "1" (Low), "2" (Moderate), "3" (Considerable), "4" (High), "5" (Very high).
cloudCover	0..1	PerCent	(NC) The proportion of the sky covered by cloud for the corresponding time interval.
dewPointTempAt2m	0..1	Temperature	(NC) The dew-point temperature at 2 metres above ground level for the corresponding time interval.
diffuseSolarIrradiance	0..1	Irradiance	(NC) The diffuse solar irradiance for the corresponding time interval.
directSolarIrradiance	0..1	Irradiance	(NC) The direct solar irradiance for the corresponding time interval.
droughtCode	0..1	Decimal	(NC) The Drought Code for the corresponding time interval. Note: The Drought Code is a component of the Canadian Fire Weather Index System representing the moisture condition of deep, compact organic fuel layers. It is particularly useful for representing the cumulative effect of prolonged dry conditions and seasonal drought on wildfire potential. Higher values indicate drier conditions. The attribute is used when the applicable wildfire methodology provides a Drought Code. Example: Values such as "15", "300" and "600" represent progressively drier conditions in the Drought Code scale. No universal low, moderate or high classification is implied by these example values; interpretation is provided by the applicable methodology and provenance.
evaporation	0..1	Length	(NC) The evaporation and evapotranspiration during the corresponding time interval, expressed as an equivalent depth of water. Note: The sign convention, where relevant, is defined by the applicable data specification.
fireWeatherIndex	0..1	Decimal	(NC) A fire-weather index indicating the meteorological conditions relevant to wildfire danger for the corresponding time interval. Note: The applicable fire-weather index methodology and classification are identified through the associated data provenance. The CIM model does not prescribe a specific wildfire classification. The Canadian Fire Weather Index (FWI) System, as used by European Forest Fire Information System (EFFIS), is one example. In this system, the index combines fuel-moisture and fire-behaviour components derived from temperature, relative humidity, wind speed and precipitation. Higher values indicate conditions increasingly favourable to intense wildfire.

name	mult	type	description
			Example: Using the EFFIS classification: "5.0" (Very low), "10.0" (Low), "15.0" (Moderate), "37.77" (High), "40.01" (Very high), "55.55" (Extreme).
freezingPrecipitationDays	0..1	Decimal	(NC) The number of days with freezing precipitation within the corresponding time interval.
frostDays	0..1	Decimal	(NC) The number of frost days within the corresponding time interval.
globalSolarIrradiance	0..1	Irradiance	(NC) The global solar irradiance for the corresponding time interval. Note: Global solar irradiance represents the total direct and diffuse solar power incident per unit area on the applicable reference surface. It may be used as an environmental input for applications such as photovoltaic production and thermal rating of overhead conductors. The orientation of the reference surface is defined by the applicable dataset or provenance information.
hailDays	0..1	Decimal	(NC) The number of days on which hail occurs within the corresponding time interval.
heatwaveDays	0..1	Decimal	(NC) The number of days occurring as part of a heatwave within the corresponding time interval.
hotDays	0..1	Decimal	(NC) The number of days meeting the applicable hot-day criterion within the corresponding time interval.
hydroInflow	0..1	RealEnergy	(NC) The energy equivalent of natural hydro inflow associated with hydro resources in the ClimateZone during the corresponding time interval. Note: The value represents inflow energy for the interval. For example, a weekly TimePoint may contain the natural hydro inflow energy for that week.
icingDays	0..1	Decimal	(NC) The number of days meeting the applicable icing criterion within the corresponding time interval.
lightningDensity	0..1	CountPerArea	(NC) The number of lightning events per unit area occurring during the corresponding time interval.
maxTempAt2m	0..1	Temperature	(NC) The maximum air temperature at 2 metres above ground level during the corresponding time interval. Note: This time series is intended for datasets providing maximum temperature directly.
minTempAt2m	0..1	Temperature	(NC) The minimum air temperature at 2 metres above ground level during the corresponding time interval. Note: This time series is intended for datasets providing minimum temperature directly, for example daily minimum temperature. It is not required when the minimum can appropriately be derived from tempAt2m.
populationWeightedTempAt2m	0..1	Temperature	(NC) The population-weighted air temperature at 2 metres above ground level for the corresponding time interval. Note: The value is derived by spatially weighting the air temperature within the represented area by the population distribution. It may be used for

name	mult	type	description
			modelling temperature-dependent energy consumption, including heating and cooling demand. The population dataset and weighting method are identified through the applicable provenance information.
potentialEvaporation	0..1	Length	(NC) The potential evaporation during the corresponding time interval, expressed as an equivalent depth of water.
precipitation	0..1	Length	(NC) The total precipitation received during the corresponding time interval. Note: The value represents accumulated precipitation expressed as an equivalent depth of water.
rainfall	0..1	Length	(NC) The amount of liquid precipitation received during the corresponding time interval. Note: The value represents accumulated rainfall expressed as an equivalent depth of water.
relativeHumidityAt2m	0..1	PerCent	(NC) The relative humidity at 2 metres above ground level for the corresponding time interval.
runoff	0..1	Length	(NC) The runoff during the corresponding time interval, expressed as an equivalent depth of water over the area.
seaCurrentDirection	0..1	AngleDegrees	(NC) The direction of the sea-water current for the corresponding time interval. Note: Current direction normally identifies the direction towards which the water is moving, unlike meteorological wind direction, which identifies the direction from which the wind originates.
seaCurrentSpeed	0..1	Speed	(NC) The speed of the sea-water current for the corresponding time interval. Note: The applicable depth or vertical reference is defined by the source dataset or provenance information.
seaIceConcentration	0..1	PerCent	(NC) The proportion of the sea surface covered by sea ice for the corresponding time interval. Note: Sea-ice concentration provides the time-dependent information needed to determine sea-ice presence and extent. It replaces a simple integer seaIce value, which cannot distinguish between partial and complete ice coverage.
seaIceThickness	0..1	Length	(NC) The sea-ice thickness for the corresponding time interval.
seaSurfaceTemp	0..1	Temperature	(NC) The sea-surface temperature for the corresponding time interval.
significantWaveHeight	0..1	Length	(NC) The significant wave height for the corresponding time interval.
snowfall	0..1	Length	(NC) The solid precipitation received during the corresponding time interval, expressed as its equivalent amount of liquid water.
snowmelt	0..1	Length	(NC) The amount of water released by melting snow during the corresponding time interval, expressed as an equivalent depth of liquid water.
snowWater	0..1	Length	(NC) The amount of water stored in the snowpack at the corresponding time, expressed as an equivalent depth of liquid water. Example: January = 180 mm, March = 430 mm, May = 160 mm, June = 0 mm.

name	mult	type	description
sunshineDuration	0..1	Hours	(NC) The duration of sunshine during the corresponding time interval.
surfacePressure	0..1	Pressure	(NC) The atmospheric pressure at the surface for the corresponding time interval. Note: Surface pressure may be relevant when determining air density for wind-energy calculations.
tempAt2m	0..1	Temperature	(NC) The air temperature at 2 metres above ground level for the corresponding time interval.
thunderDays	0..1	Decimal	(NC) The number of days on which thunder is observed within the corresponding time interval.
tropicalNights	0..1	Decimal	(NC) The number of nights meeting the applicable tropical-night criterion within the corresponding time interval.
waveDirection	0..1	AngleDegrees	(NC) The direction from which waves propagate for the corresponding time interval. Note: No corresponding normal value is defined because a single average direction may not meaningfully represent a multi-directional sea state.
wavePeriod	0..1	Seconds	(NC) The representative wave period for the corresponding time interval.
windDirectionAt100m	0..1	AngleDegrees	(NC) The wind direction at 100 metres above ground level for the corresponding time interval. Note: Meteorological wind direction normally identifies the direction from which the wind originates.
windDirectionAt10m	0..1	AngleDegrees	(NC) The wind direction at 10 metres above ground level for the corresponding time interval. Note: Meteorological wind direction normally identifies the direction from which the wind originates. No corresponding normal attribute is defined because a single average direction may be misleading for multimodal wind regimes.
windGustAt10m	0..1	Speed	(NC) The maximum wind gust at 10 metres above ground level during the corresponding time interval. Note: The time interval over which the gust maximum applies is defined by the associated Schedule and TimePoint.
windSpeedAt100m	0..1	Speed	(NC) The wind speed at 100 metres above ground level for the corresponding time interval.
windSpeedAt10m	0..1	Speed	(NC) The wind speed at 10 metres above ground level for the corresponding time interval.

3.51 (NC,Description) CompensatorController

Inheritance path = AutomationFunction

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

Table 44 shows all attributes of CompensatorController.

Table 44 – Attributes of SteadyStateInstructionProfile::CompensatorController

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

3.52 (NC,Description) 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 45 shows all attributes of ContingencyWithRemedialAction.

Table 45 – Attributes of SteadyStateInstructionProfile::ContingencyWithRemedialAction

name	mult	type	description
enabled	1..1	Boolean	(NC) If true, the contingency with remedial action is enabled, otherwise it is disabled.

3.53 (NC,Description) CountertradeRemedialAction

Inheritance path = PowerRemedialAction : RemedialAction
Countertrade is a remedial action to relieve physical congestions where the location of activated resources within the bidding zone is not known.
Table 46 shows all attributes of CountertradeRemedialAction.

Table 46 – Attributes of SteadyStateInstructionProfile::CountertradeRemedialAction

name	mult	type	description
maxRegulatingDown	0..1	ActivePower	(NC) inherited from: PowerRemedialAction
maxRegulatingUp	0..1	ActivePower	(NC) inherited from: PowerRemedialAction
available	1..1	Boolean	(NC) inherited from: RemedialAction

3.54 (NC,new) CountPerArea datatype

Number of discrete occurrences or events per unit area.
Note: Intended for spatial event densities such as lightning density. A new UnitSymbol countPerm2 is required if this quantity is represented as a CIMDatatype with an explicit unit.
Table 47 shows all attributes of CountPerArea.

Table 47 – Attributes of SteadyStateInstructionProfile::CountPerArea

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	
value	0..1	Float	

3.55 (NC,Description) CrossBorderRelevance root class

Combination of an assessed element and one or more bidding zone border that are affected by the assessment.
Table 48 shows all attributes of CrossBorderRelevance.

Table 48 – Attributes of SteadyStateInstructionProfile::CrossBorderRelevance

name	mult	type	description
enabled	1..1	Boolean	(NC) If true, the cross border relevance is enabled, otherwise it is disabled.

3.56 (NC,Description) CurrentControlFunction

Inheritance path = FunctionBlock

Current control function is a function block that calculates the operating point of the controlled equipment to achieve the target current.
Table 49 shows all attributes of CurrentControlFunction.

Table 49 – Attributes of SteadyStateInstructionProfile::CurrentControlFunction

name	mult	type	description
targetValue	1..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.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.57 (NC,Description) CurrentDroopControlFunction

Inheritance path = FunctionBlock
Current droop control function is a function block that calculates the operating point of the controlled equipment to achieve the target current.
Table 50 shows all attributes of CurrentDroopControlFunction.

Table 50 – Attributes of SteadyStateInstructionProfile::CurrentDroopControlFunction

name	mult	type	description
targetValueInductive	1..1	CurrentFlow	(NC) Setpoint when control is active in inductive region.
targetValueCapacitive	1..1	CurrentFlow	(NC) Setpoint when control is active in capacitive region.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.58 (NC,Description) 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 51 shows all attributes of CurrentDroopOverride.

Table 51 – Attributes of SteadyStateInstructionProfile::CurrentDroopOverride

name	mult	type	description
targetValueInductivel	1..1	CurrentFlow	(NC) Setpoint when control is active in inductive region.
enabled	1..1	Boolean	(NC) True, if the current droop override is enabled (active). Otherwise false.
targetValueCapacitivel	1..1	CurrentFlow	(NC) Setpoint when control is active in capacitive region.

3.59 (NC,Description) DCActivePowerControlFunction

Inheritance path = FunctionBlock
Direct current active power control function is a function block that calculates operating point of the controlled equipment to achieve the target active power.
Table 52 shows all attributes of DCActivePowerControlFunction.

Table 52 – Attributes of SteadyStateInstructionProfile::DCActivePowerControlFunction

name	mult	type	description
targetValue	1..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.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.60 (NC,Description) DCCurrentControlFunction

Inheritance path = FunctionBlock

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

Table 53 shows all attributes of DCCurrentControlFunction.

Table 53 – Attributes of SteadyStateInstructionProfile::DCCurrentControlFunction

name	mult	type	description
targetValue	1..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.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.61 (NC,Description) DCEquivalentInjection

Inheritance path = Equipment

This class represents direct current equivalent injections (generation or load).

Table 54 shows all attributes of DCEquivalentInjection.

Table 54 – Attributes of SteadyStateInstructionProfile::DCEquivalentInjection

name	mult	type	description
p	1..1	ActivePower	(NC) Equivalent DC active power injection. Load sign convention is used, i.e. positive sign means flow out from a node. Starting value for steady state solutions.
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.62 (NC,Description) DCExtinctionAngleControlFunction

Inheritance path = FunctionBlock

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

Table 55 shows all attributes of DCExtinctionAngleControlFunction.

Table 55 – Attributes of SteadyStateInstructionProfile::DCExtinctionAngleControlFunction

name	mult	type	description
targetValue	1..1	AngleDegrees	(NC) Target value for the extinction angle that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.63 (NC,Description) DCFiringAngleControlFunction

Inheritance path = FunctionBlock
Direct current firing angle control function is a function block that calculates operating point of the controlled equipment to achieve the target firing angle.
Table 56 shows all attributes of DCFiringAngleControlFunction.

Table 56 – Attributes of SteadyStateInstructionProfile::DCFiringAngleControlFunction

name	mult	type	description
targetValue	1..1	AngleDegrees	(NC) Target value for the firing angle that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.64 (NC,Description) DCPole root class

The direct current (DC) system pole (IEC 60633) is part of a DC system consisting of all the equipment in the DC substations and the interconnecting transmission lines, if any, which during normal operation exhibit a common direct voltage polarity with respect to earth.
It includes active power, reactive power and participation factor to be able to schedule top down (using DCTieCorridor and participation factor to provide schedule on the DCPole) and bottom up (aggregation of DCPole to DCTieCorridor). Only one approach can be used at a time.
Table 57 shows all attributes of DCPole.

Table 57 – Attributes of SteadyStateInstructionProfile::DCPole

name	mult	type	description
p	0..1	ActivePower	(NC) Active power flow for the pole. The attribute is a positive value. The direction is given by the DCTieCorridor association with BiddingZoneBorder.
q	0..1	ReactivePower	(NC) Reactive power flow for the pole. The attribute is a positive value. The direction is given by the DCTieCorridor association with BiddingZoneBorder.
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.
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.

3.65 (NC,Description) DCPulseWidthModulationControlFunction

Inheritance path = FunctionBlock

Direct current pulse width modulation control function is a function block that calculates operating point of the controlled equipment to achieve the target pulse width modulation.
Table 58 shows all attributes of DCPulseWidthModulationControlFunction.

Table 58 – Attributes of SteadyStateInstructionProfile::DCPulseWidthModulationControlFunction

name	mult	type	description
targetValue	1..1	Float	(NC) Target value for the pulse width factor that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.66 (Description) DCSwitch

Inheritance path = Equipment
A switch within the DC system.
Table 59 shows all attributes of DCSwitch.

Table 59 – Attributes of SteadyStateInstructionProfile::DCSwitch

name	mult	type	description
open	1..1	Boolean	(NC) The attribute tells if the switch is considered open when used as input to topology processing.
locked	0..1	Boolean	(NC) 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.
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.67 (NC,Description) DCTieCorridor root class

A collection of one or more direct current poles that connect two different control areas.
DCTieCorridor is linked to its own SchedulingArea. The active and reactive power is given by the SchedulingArea. The flow direction is provided by the link with the directional bidding zone.
Table 60 shows all association ends of DCTieCorridor with other classes.

Table 60 – Association ends of SteadyStateInstructionProfile::DCTieCorridor with other classes

mult from	name	mult to	type	description
0..1	SourceBiddingZone	1..1	BiddingZoneBorder	(NC) The source bidding zone border that is related to the DC tie corridor.

3.68 (NC,Description) DCVoltageControlFunction

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

Table 61 shows all attributes of DCVoltageControlFunction.

Table 61 – Attributes of SteadyStateInstructionProfile::DCVoltageControlFunction

name	mult	type	description
targetValue	1..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.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.69 (NC,Description) DCVoltageSource

Inheritance path = Equipment
DC conducting equipment capable of establishing, maintaining, or controlling a DC voltage difference between connected DC terminals.
Table 62 shows all attributes of DCVoltageSource.

Table 62 – Attributes of SteadyStateInstructionProfile::DCVoltageSource

name	mult	type	description
voltageSetpoint	0..1	Voltage	(NC) Target or regulated DC voltage maintained by the source.
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.70 (NC) DirectCurrentEquipmentController

Inheritance path = AutomationFunction
Direct current equipment controller used to control different parts of the hierarchical structure of the DC control system defined by IEC 60633.
Table 63 shows all attributes of DirectCurrentEquipmentController.

Table 63 – Attributes of SteadyStateInstructionProfile::DirectCurrentEquipmentController

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

3.71 (NC,Description) EnergyBlockOrder root class

The energy block order is a block (an amount) of energy that forms the sequence of orders that are going to be distributed to an energy block component.
Table 64 shows all attributes of EnergyBlockOrder.

Table 64 – Attributes of SteadyStateInstructionProfile::EnergyBlockOrder

name	mult	type	description
sequence	0..1	Integer	(NC) Sequence needs to be ordered by the scheduling area. It has to be unique by the scheduling area.
p	0..1	ActivePower	(NC) The maximum active power that can be applied as part of this block order.
participationFactor	0..1	Float	(NC) Participation factor.

3.72 (Description) EnergyConsumer

Inheritance path = Equipment

Generic user of energy - a point of consumption on the power system model.

EnergyConsumer.pfixed, .qfixed, .pfixedPct and .qfixedPct have meaning only if there is no LoadResponseCharacteristic associated with EnergyConsumer or if LoadResponseCharacteristic.exponentModel is set to False.

Table 65 shows all attributes of EnergyConsumer.

Table 65 – Attributes of SteadyStateInstructionProfile::EnergyConsumer

name	mult	type	description
participationFactor	0..1	Float	(deprecated,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.
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.73 (NC,Description) EnergyResourceGroupCapacity root class

An aggregation of energy resources having common energy characteristics for which installed, available, or effective capacity is represented.

Note: EnergyResourceGroupCapacity groups energy resources for capacity modelling, forecasting, scenario analysis and aggregation. The group may be characterised by an energy kind, energy source, technology, location, scenario, weather condition or other modelling context.

The aggregated capacity may be represented by static values or by time-series values describing forecast, scheduled, actual or hindcast conditions. An EnergyComponent represents the part of an aggregated value associated with a particular underlying unit or resource. The aggregated value of the EnergyResourceGroupCapacity may therefore be distributed among its associated EnergyComponents, for example in proportion to the capability of the corresponding units or according to an ordered block-based allocation.

Weather or other environmental information may be referenced where it is relevant to the capacity or availability of the grouped resources/

Table 66 shows all attributes of EnergyResourceGroupCapacity.

Table 66 – Attributes of SteadyStateInstructionProfile::EnergyResourceGroupCapacity

name	mult	type	description
participationFactor	0..1	Float	(NC) Participation factor for the power group in relation to scheduling area. Must be a positive value.
p	0..1	ActivePower	(NC) The effective active power capacity for the resource at the specified time, after considering all applied deratings, outages, operational limits, or weather influences. This value represents the usable capacity that can be delivered or consumed, effective capacity.
availabilityFactor	0..1	PerCent	(NC) The ratio (in percent) between the effective available capacity and the installed capacity over a defined time interval. For weather-dependent

name	mult	type	description
			resources, the value reflects climate-driven availability as derived from meteorological or hydrological conditions.
availableCapacityP	0..1	ActivePower	(NC) The weather or condition-dependent active power capacity that is realistically available for operation at a given time. This value reflects reductions due to climatic, hydrological, or operational constraints.
installedCapacityP	0..1	ActivePower	(NC) The nominal installed active power capacity of the energy type, independent of weather or operating conditions. This is the maximum technical power rating under standard design assumptions and optimum operation condition.
capacityAllocationFactor	0..1	Float	(NC) The relative weighting used to allocate an aggregate capacity requirement to this energy resource group on a time-series basis. Note: The values provide context-specific top-down capacity allocation weightings and may override normalCapacityAllocationFactor. Each value applies to the corresponding time interval represented by the time-series context. The factors are relative weights and are not required to represent percentages or to sum to 1. The allocation algorithm may normalize or otherwise adjust the applicable factors according to availability, existing capacity and other modelling constraints.

3.74 (abstract,Description) Equipment root class

The parts of a power system that are physical devices, electronic or mechanical.
Table 67 shows all attributes of Equipment.

Table 67 – Attributes of SteadyStateInstructionProfile::Equipment

name	mult	type	description
inService	1..1	Boolean	Specifies the availability of the equipment. True means the equipment is available for topology processing, which determines if the equipment is energized or not. False means that the equipment is treated by network applications as if it is not in the model.
networkAnalysisEnabled	0..1	Boolean	The equipment is enabled to participate in network analysis. If unspecified, the value is assumed to be true.

3.75 (NC,Description) ExceptionalContingency

Inheritance path = Contingency
Exceptional contingency means the simultaneous occurrence of multiple contingencies with a common cause.
Table 68 shows all attributes of ExceptionalContingency.

Table 68 – Attributes of SteadyStateInstructionProfile::ExceptionalContingency

name	mult	type	description
mustStudy	1..1	Boolean	inherited from: Contingency
probability	0..1	PerCent	(NC) inherited from: Contingency

3.76 (abstract,NC) FACTSEquipment

Inheritance path = RegulatingCondEq : Equipment
Flexible Alternating Current Transmission System regulating equipment.
Table 69 shows all attributes of FACTSEquipment.

Table 69 – Attributes of SteadyStateInstructionProfile::FACTSEquipment

name	mult	type	description
q	1..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.
controlEnabled	1..1	Boolean	inherited from: RegulatingCondEq
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.77 (NC,Description) FrequencyControlFunction

Inheritance path = FunctionBlock
Frequency control function is a function block that calculate the operating point of the controlled equipment to achieve the target frequency.
Table 70 shows all attributes of FrequencyControlFunction.

Table 70 – Attributes of SteadyStateInstructionProfile::FrequencyControlFunction

name	mult	type	description
frequencyBias	1..1	Float	(NC) Frequency bias that the control function is using to achieve by adjusting the operational setting to the controlled equipment.
targetValue	1..1	Frequency	(NC) Target value for the frequency that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.78 (NC,Description) FuelStorage root class

Fuel storage. e.g. pile of coal that can be shared between multiple thermal generating units.
Table 71 shows all attributes of FuelStorage.

Table 71 – Attributes of SteadyStateInstructionProfile::FuelStorage

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

3.79 (abstract,NC) FunctionBlock root class

Function block is a function described as a set of elementary blocks. The blocks describe the function between input variables and output variables.
Table 72 shows all attributes of FunctionBlock.

Table 72 – Attributes of SteadyStateInstructionProfile::FunctionBlock

name	mult	type	description
enabled	1..1	Boolean	(NC) True, if the function block is enabled (active). Otherwise false.

3.80 (abstract,NC) GateInputPin root class

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 73 shows all attributes of GateInputPin.

Table 73 – Attributes of SteadyStateInstructionProfile::GateInputPin

name	mult	type	description
enabled	1..1	Boolean	(NC) True, if the gate input pin is enabled (active). Otherwise false.

3.81 (Description) GeneratingUnit

Inheritance path = Equipment
A single or set of synchronous machines for converting mechanical power into alternating-current power. For example, individual machines within a set may be defined for scheduling purposes while a single control signal is derived for the set. In this case there would be a GeneratingUnit for each member of the set and an additional GeneratingUnit corresponding to the set.
Table 74 shows all attributes of GeneratingUnit.

Table 74 – Attributes of SteadyStateInstructionProfile::GeneratingUnit

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.
mustRunP	0..1	ActivePower	(NC) Minimum active power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
startupCost	0..1	Money	The initial startup cost incurred for each start of the GeneratingUnit.
warmStartupCost	0..1	Decimal	(NC) The warm startup cost incurred for each start of the GeneratingUnit.
mustRunQ	0..1	ReactivePower	(NC) Minimum reactive power injection that is needed to meet must-run requirement. This value can be higher or equal to minimum operational limit. Load sign convention is used, i.e. positive sign means flow out from a node.
mustRun	0..1	Boolean	(NC) Identifies if the generating unit is ramping up or down. If true, the generating unit is ramping and constraints should be ignored.
costCurrency	0..1	Currency	(NC) Currency the cost is given in.
shutdownCost	0..1	Decimal	(NC) The shutdown cost incurred for each shutdown of the GeneratingUnit.
isRamping	1..1	Boolean	(NC) Identifies if the generating unit is ramping up or down. If true, the generating unit is ramping and constraints should be ignored.

name	mult	type	description
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.82 (NC,Description) GridPowerCapacity root class

Grid power capacity defines the active power capacity that can be imported, exported, generated, consumed, or transferred within a defined power system area, or a combination of multiple areas (e.g. a bidding zone), considering relevant grid constraints required for secure and reliable operation.
Note: Grid power capacity represents a power system or network-constrained capacity, not the technical installed capacity of individual resources or groups of resources. It may describe limits on generation, consumption, import, export, or power transfer resulting from operational security limits, network constraints, capacity allocation, forecasted grid availability, planned outages, remedial actions, or market-relevant transmission limitations.
Table 75 shows all attributes of GridPowerCapacity.

Table 75 – Attributes of SteadyStateInstructionProfile::GridPowerCapacity

name	mult	type	description
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.
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.
regulatingDownAllocation	0..1	ActivePower	(NC) The balancing capacity allocated for regulating down, by decreasing the production, increasing the direct current export, decreasing direct current import or increasing the consumption of energy in the bidding zone. This must be a positive number.

3.83 (abstract,NC) GridStateAlteration root class

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 76 shows all attributes of GridStateAlteration.

Table 76 – Attributes of SteadyStateInstructionProfile::GridStateAlteration

name	mult	type	description
enabled	1..1	Boolean	(NC) The status of the GridStateAlteration set by an operation or by a signal resulting from a control action.
participationFactor	0..1	PerCent	(NC) Participation factor describing the entity part of the active power provided by a collection of entities (e.g. an active power forecast to a collection of entities is divided to each of the member entity according to the participation factor). Must be a positive value. In the case of a sharing strategy, the distribution is following entities value (V) equals aggregated value (T) divided by sum of participation factors (PF), i.e. V=T/sum(PF). In the case of priority strategy, the item with the lowest number gets allocated energy first. e.g. If 0 this grid alteration does not participate. The sum of all participation factors for all grid state alterations associated with same remedial action shall be equal to 100%.

3.84 (NC,Description) GridStateAlterationRemedialAction

Inheritance path = RemedialAction

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 77 shows all attributes of GridStateAlterationRemedialAction.

Table 77 – Attributes of SteadyStateInstructionProfile::GridStateAlterationRemedialAction

name	mult	type	description
available	1..1	Boolean	(NC) inherited from: RemedialAction

3.85 (Description) HydroPump

Inheritance path = Equipment

A synchronous motor-driven pump, typically associated with a pumped storage plant.

Table 78 shows all attributes of HydroPump.

Table 78 – Attributes of SteadyStateInstructionProfile::HydroPump

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.
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.86 (NC,Description) ImpedanceControlFunction

Inheritance path = FunctionBlock
Impedance control function is a function block that calculates the operating point of the controlled equipment to achieve the target impedance.
Table 79 shows all attributes of ImpedanceControlFunction.

Table 79 – Attributes of SteadyStateInstructionProfile::ImpedanceControlFunction

name	mult	type	description
targetValue	1..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.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.87 (NC,Description) InfeedLimit root class

Infeed limit set constraints fed in to the network by two or more terminals.
Table 80 shows all attributes of InfeedLimit.

Table 80 – Attributes of SteadyStateInstructionProfile::InfeedLimit

name	mult	type	description
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.

3.88 (NC,Description) InjectionController

Inheritance path = AutomationFunction
Injection controller is controlling the equipment which represents an injection or an external network.
Table 81 shows all attributes of InjectionController.

Table 81 – Attributes of SteadyStateInstructionProfile::InjectionController

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

3.89 (NC,Description) IntertemporalPropertyRange

Inheritance path = RangeConstraint
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 82 shows all attributes of IntertemporalPropertyRange.

Table 82 – Attributes of SteadyStateInstructionProfile::IntertemporalPropertyRange

name	mult	type	description
value	1..1	Float	(NC) inherited from: RangeConstraint

3.90 (NC,new) Irradiance datatype

Power carried by electromagnetic radiation incident on a surface per unit area.
Note: Intended for solar irradiance values such as global, direct and diffuse solar irradiance.
Table 83 shows all attributes of Irradiance.

Table 83 – Attributes of SteadyStateInstructionProfile::Irradiance

name	mult	type	description
multiplier	0..1	UnitMultiplier	
unit	0..1	UnitSymbol	
value	0..1	Float	

3.91 (NC,Description) LoadFrequencyControlArea root class

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 84 shows all attributes of LoadFrequencyControlArea.

Table 84 – Attributes of SteadyStateInstructionProfile::LoadFrequencyControlArea

name	mult	type	description
fcrContracted	0..1	ActivePower	(NC) The contracted active power capacity for Frequency Containment Reserves (FCR). Represents the portion of FCR provision secured through contracts, tenders, or other procurement mechanisms, available for activation when needed.
fcrAvailable	0..1	ActivePower	(NC) The actual available active power capacity at a given time that can deliver Frequency Containment Reserves (FCR), considering unit status, technical constraints, and system conditions. This is the calculated reserves in real-time or operation planning.
aFRRContracted	0..1	ActivePower	(NC) The contracted active power capacity for automatic Frequency Restoration Reserves (aFRR). Represents the portion of aFRR provision secured through procurement arrangements (market-based or bilateral), available to the Automatic Generation Control (AGC) process for activation.
aFRRAvailable	0..1	ActivePower	(NC) The actual available active power capacity that can deliver automatic Frequency Restoration Reserves (aFRR) at a given moment, considering online resources, Automatic Generation Control (AGC) participation, and technical limits. Reflects the true operational flexibility available to respond automatically to frequency deviations.
aFRRActivated	0..1	ActivePower	(NC) The real-time or in simulation active power delivered as automatic Frequency Restoration Reserves (aFRR), automatically activated by the automatic generation control (AGC) system to restore frequency and area control error (ACE).

name	mult	type	description
			Represents the actual MW change at that instant.
mFRRContracted	0..1	ActivePower	(NC) The contracted active power capacity for manual Frequency Restoration Reserves (mFRR). Represents the portion of Frequency Restoration Reserves (FRR) provision secured by the system operator through procurement mechanisms (market/bilateral) and made available for manual activation when needed.
mFRRActivated	0..1	ActivePower	(NC) The real-time or in simulation active power delivered as Frequency Restoration Reserves (mFRR), manually activated by the system operator or a central dispatch system to restore system frequency and area control error (ACE).

3.92 (NC,Description) ModularStaticSynchronousSeriesCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : Equipment

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 85 shows all attributes of ModularStaticSynchronousSeriesCompensator.

Table 85 – Attributes of SteadyStateInstructionProfile::ModularStaticSynchronousSeriesCompensator

name	mult	type	description
q	1..1	ReactivePower	(NC) inherited from: FACTSEquipment
controlEnabled	1..1	Boolean	inherited from: RegulatingCondEq
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.93 (NC,Description) OrdinaryContingency

Inheritance path = Contingency

Ordinary contingency means the occurrence of a contingency of a single branch or injection.

Table 86 shows all attributes of OrdinaryContingency.

Table 86 – Attributes of SteadyStateInstructionProfile::OrdinaryContingency

name	mult	type	description
mustStudy	1..1	Boolean	inherited from: Contingency
probability	0..1	PerCent	(NC) inherited from: Contingency

3.94 (NC,Description) OutOfRangeContingency

Inheritance path = Contingency

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 87 shows all attributes of OutOfRangeContingency.

Table 87 – Attributes of SteadyStateInstructionProfile::OutOfRangeContingency

name	mult	type	description
mustStudy	1..1	Boolean	inherited from: Contingency
probability	0..1	PerCent	(NC) inherited from: Contingency

3.95 (NC,Description) PhaseControlFunction

Inheritance path = FunctionBlock
Phase control function is a function block that calculate the operating point of the controlled equipment to achieve the target voltage.
Table 88 shows all attributes of PhaseControlFunction.

Table 88 – Attributes of SteadyStateInstructionProfile::PhaseControlFunction

name	mult	type	description
targetValue	1..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.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.96 (NC) PinContingency

Inheritance path = GateInputPin
Input pin associated with a Contingency. It is used for comparison.
Table 89 shows all attributes of PinContingency.

Table 89 – Attributes of SteadyStateInstructionProfile::PinContingency

name	mult	type	description
enabled	1..1	Boolean	(NC) inherited from: GateInputPin

3.97 (NC) PinDCTerminal

Inheritance path = GateInputPin
Input pin associated with a DCTerminal. It is used for comparison.
Table 90 shows all attributes of PinDCTerminal.

Table 90 – Attributes of SteadyStateInstructionProfile::PinDCTerminal

name	mult	type	description
enabled	1..1	Boolean	(NC) inherited from: GateInputPin

3.98 (NC) PinEquipment

Inheritance path = GateInputPin
Input pin associated with an Equipment. It is used for the comparison.
Table 91 shows all attributes of PinEquipment.

Table 91 – Attributes of SteadyStateInstructionProfile::PinEquipment

name	mult	type	description
enabled	1..1	Boolean	(NC) inherited from: GateInputPin

3.99 (NC) PinEquipmentTripping

Inheritance path = GateInputPin
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 92 shows all attributes of PinEquipmentTripping.

Table 92 – Attributes of SteadyStateInstructionProfile::PinEquipmentTripping

name	mult	type	description
enabled	1..1	Boolean	(NC) inherited from: GateInputPin

3.100 (NC) PinGate

Inheritance path = GateInputPin
An output from one gate represents an input to another gate.
Table 93 shows all attributes of PinGate.

Table 93 – Attributes of SteadyStateInstructionProfile::PinGate

name	mult	type	description
enabled	1..1	Boolean	(NC) inherited from: GateInputPin

3.101 (NC) PinMeasurement

Inheritance path = GateInputPin
Input pin associated with a Measurement. It is used for comparison.
Table 94 shows all attributes of PinMeasurement.

Table 94 – Attributes of SteadyStateInstructionProfile::PinMeasurement

name	mult	type	description
enabled	1..1	Boolean	(NC) inherited from: GateInputPin

3.102 (NC) PinOperationalLimit

Inheritance path = GateInputPin
Input pin associated with the limits of a Terminal. It is used for comparison.
Table 95 shows all attributes of PinOperationalLimit.

Table 95 – Attributes of SteadyStateInstructionProfile::PinOperationalLimit

name	mult	type	description
enabled	1..1	Boolean	(NC) inherited from: GateInputPin

3.103 (NC) PinPowerTransferCorridor

Inheritance path = GateInputPin
Input pin associated with a PowerTransferCorridor. It is used for comparison.
Table 96 shows all attributes of PinPowerTransferCorridor.

Table 96 – Attributes of SteadyStateInstructionProfile::PinPowerTransferCorridor

name	mult	type	description
enabled	1..1	Boolean	(NC) inherited from: GateInputPin

3.104 (NC) PinTerminal

Inheritance path = GateInputPin
Input pin associated with a Terminal. It is used for comparison.
Table 97 shows all attributes of PinTerminal.

Table 97 – Attributes of SteadyStateInstructionProfile::PinTerminal

name	mult	type	description
enabled	1..1	Boolean	(NC) inherited from: GateInputPin

3.105 (NC,Description) PowerFactorControlFunction

Inheritance path = FunctionBlock
Power factor control function is a function block that calculates the operating point of the controlled equipment to achieve the target power factor.
Table 98 shows all attributes of PowerFactorControlFunction.

Table 98 – Attributes of SteadyStateInstructionProfile::PowerFactorControlFunction

name	mult	type	description
targetValue	1..1	Float	(NC) Target power-factor value that the control function aims to achieve by adjusting the operating setpoint of the controlled equipment. A positive value represents capacitive operation, while a negative value represents inductive operation.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.106 (abstract,NC) PowerRemedialAction

Inheritance path = RemedialAction
Energy remedial action describes actions to rearrange power schedules.
Table 99 shows all attributes of PowerRemedialAction.

Table 99 – Attributes of SteadyStateInstructionProfile::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	1..1	Boolean	(NC) inherited from: RemedialAction

3.107 (NC,Description) PowerShiftKeyStrategy root class

Strategy of the power shift key.
Table 100 shows all attributes of PowerShiftKeyStrategy.

Table 100 – Attributes of SteadyStateInstructionProfile::PowerShiftKeyStrategy

name	mult	type	description
participationFactor	0..1	Float	(NC) Participation factor describing the entities part of the power shift strategy. Must be a positive value.
enabled	1..1	Boolean	(NC) If true, the assessed element is enabled, otherwise it is disabled.

3.108 (NC,Description) PowerTransferCorridor root class

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 101 shows all attributes of PowerTransferCorridor.

Table 101 – Attributes of SteadyStateInstructionProfile::PowerTransferCorridor

name	mult	type	description
enabled	1..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.

3.109 (NC,Description) PTCActivePowerSupport root class

Defines the active power capability (support) of the scheme in relation to a PowerTransferCorridor.
Table 102 shows all attributes of PTCActivePowerSupport.

Table 102 – Attributes of SteadyStateInstructionProfile::PTCActivePowerSupport

name	mult	type	description
value	1..1	ActivePower	(NC) The support that a System Integrity Protection Scheme (SIPS) gives to a Power Transfer Corridor (PTC).

3.110 (abstract,NC) RangeConstraint root class

Defines the rage constraint.
Table 103 shows all attributes of RangeConstraint.

Table 103 – Attributes of SteadyStateInstructionProfile::RangeConstraint

name	mult	type	description
value	1..1	Float	(NC) The value at the time. The meaning of the value is defined by the attribute referenced by the PropertyReference. The attribute value can be integer, float or boolean. In case of boolean 1.0 equals true and 0.0 equals false. In case of integer the 0 should be included as a decimal, e.g. 2.0. If the valueKind equals incremental or incrementalPercentage, then the attribute value shall be positive (greater than zero). If the valueKind equals absolute, it does not constraint attribute value to be positive. If the valueKind equals incrementalPercentage, then the attribute value “100.0” shall represent 100%. The attribute value shall be positive float (0.0 value is not allowed) and can exceed 100.0.

3.111 (NC,Description) ReactivePowerControlFunction

Inheritance path = FunctionBlock
Reactive power control function is a function block that calculate the operating point of the controlled equipment to achieve the target reactive power.
Table 104 shows all attributes of ReactivePowerControlFunction.

Table 104 – Attributes of SteadyStateInstructionProfile::ReactivePowerControlFunction

name	mult	type	description
targetValue	1..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.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.112 (NC,Description) RedispatchRemedialAction

Inheritance path = PowerRemedialAction : RemedialAction
Redispatch remedial action is a remedial action that through rearranging power schedules is eliminating breaches of constraints.
Table 105 shows all attributes of RedispatchRemedialAction.

Table 105 – Attributes of SteadyStateInstructionProfile::RedispatchRemedialAction

name	mult	type	description
maxRegulatingDown	0..1	ActivePower	(NC) inherited from: PowerRemedialAction
maxRegulatingUp	0..1	ActivePower	(NC) inherited from: PowerRemedialAction
available	1..1	Boolean	(NC) inherited from: RemedialAction

3.113 (abstract,NC) RemedialAction root class

Remedial action describes one or more actions that can be performed on a given power system model situation to eliminate one or more identified breaches of constraints. The remedial action can be costly, and have a cost characteristic, or non costly.
Table 106 shows all attributes of RemedialAction.

Table 106 – Attributes of SteadyStateInstructionProfile::RemedialAction

name	mult	type	description
available	1..1	Boolean	(NC) Identifies if the remedial action can be used in further processes. True means available, False means unavailable. For instance, remedial action optimisation and coordination.

3.114 (NC,Description) 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 107 shows all attributes of RemedialActionDependency.

Table 107 – Attributes of SteadyStateInstructionProfile::RemedialActionDependency

name	mult	type	description
enabled	1..1	Boolean	(NC) If true, the remedial action dependency is enabled, otherwise it is disabled.

3.115 (NC,Description) RemedialActionGroup root class

Grouping of remedial actions that can be operated together.
Table 108 shows all attributes of RemedialActionGroup.

Table 108 – Attributes of SteadyStateInstructionProfile::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.

3.116 (NC,Description) RemedialActionScheme root class

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 109 shows all attributes of RemedialActionScheme.

Table 109 – Attributes of SteadyStateInstructionProfile::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.
inService	0..1	Boolean	(NC) Indicates if the remedial action scheme and related assets are active and can participate in system operation. If true, the scheme is active. If false, the scheme is treated as if it is not in the model.

3.117 (Description) Reservoir root class

A water storage facility within a hydro system, including: ponds, lakes, lagoons, and rivers. The storage is usually behind some type of dam.
Table 110 shows all attributes of Reservoir.

Table 110 – Attributes of SteadyStateInstructionProfile::Reservoir

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

3.118 (NC,Description) RotatingMachineController

Inheritance path = AutomationFunction
Rotating machine controller is controlling the equipment which may be used as a generator or motor.
Table 111 shows all attributes of RotatingMachineController.

Table 111 – Attributes of SteadyStateInstructionProfile::RotatingMachineController

name	mult	type	description
mode	1..1	RotatingMachineControlModeKind	(NC) Mode of the rotating machine controller.
enabled	1..1	Boolean	(NC) inherited from: AutomationFunction

3.119 (NC,Description) ScheduleResource root class

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 112 shows all attributes of ScheduleResource.

Table 112 – Attributes of SteadyStateInstructionProfile::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.
p	0..1	ActivePower	(NC) Active power injection. Load sign convention is used, i.e. positive sign means flow out from a node.

3.120 (NC,Description) SchedulingArea root class

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 113 shows all attributes of SchedulingArea.

Table 113 – Attributes of SteadyStateInstructionProfile::SchedulingArea

name	mult	type	description
p	0..1	ActivePower	(NC) Netted active power representing production, consumption and import/export for the scheduling area. Load sign convention is used, i.e. positive value indicates flow into the area.
q	0..1	ReactivePower	(NC) Netted reactive power representing production, consumption and import/export for the scheduling area. Load sign convention is used, i.e. positive value indicates flow into the area.
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

name	mult	type	description
			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.

3.121 (NC,Description) SchemeRemedialAction

Inheritance path = RemedialAction
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 114 shows all attributes of SchemeRemedialAction.

Table 114 – Attributes of SteadyStateInstructionProfile::SchemeRemedialAction

name	mult	type	description
available	1..1	Boolean	(NC) inherited from: RemedialAction

3.122 (NC,Description) SSSCController

Inheritance path = AutomationFunction
The controller of a Static synchronous series compensator (SSSC).
Table 115 shows all attributes of SSSCController.

Table 115 – Attributes of SteadyStateInstructionProfile::SSSCController

name	mult	type	description
mode	1..1	SSSCControlModeKind	(NC) Mode of the Static Synchronous Series compensator controller.
enabled	1..1	Boolean	(NC) inherited from: AutomationFunction

3.123 (NC,Description) StageTrigger root class

Stage that is triggered either by TriggerCondition or by gate condition within a stage.
Table 116 shows all attributes of StageTrigger.

Table 116 – Attributes of SteadyStateInstructionProfile::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.
inService	0..1	Boolean	(NC) Indicates if the stage trigger is in service.

3.124 (NC,Description) StaticPropertyRange

Inheritance path = RangeConstraint
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 117 shows all attributes of StaticPropertyRange.

Table 117 – Attributes of SteadyStateInstructionProfile::StaticPropertyRange

name	mult	type	description
value	1..1	Float	(NC) inherited from: RangeConstraint

3.125 (NC,Description) StaticSynchronousCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : Equipment
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 118 shows all attributes of StaticSynchronousCompensator.

Table 118 – Attributes of SteadyStateInstructionProfile::StaticSynchronousCompensator

name	mult	type	description
q	1..1	ReactivePower	(NC) inherited from: FACTSEquipment
controlEnabled	1..1	Boolean	inherited from: RegulatingCondEq
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.126 (NC,Description) StaticSynchronousSeriesCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : Equipment
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 119 shows all attributes of StaticSynchronousSeriesCompensator.

Table 119 – Attributes of SteadyStateInstructionProfile::StaticSynchronousSeriesCompensator

name	mult	type	description
q	1..1	ReactivePower	(NC) inherited from: FACTSEquipment
controlEnabled	1..1	Boolean	inherited from: RegulatingCondEq
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.127 (NC,Description) StaticVarCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : Equipment

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 120 shows all attributes of StaticVarCompensator.

Table 120 – Attributes of SteadyStateInstructionProfile::StaticVarCompensator

name	mult	type	description
q	1..1	ReactivePower	(NC) inherited from: FACTSEquipment
controlEnabled	1..1	Boolean	inherited from: RegulatingCondEq
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.128 (NC,Description) SubstationController root class

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

Table 121 shows all attributes of SubstationController.

Table 121 – Attributes of SteadyStateInstructionProfile::SubstationController

name	mult	type	description
mode	1..1	SubstationControllerModeKind	(NC) Mode of the substation controller.

3.129 (NC,Description) TCSCController

Inheritance path = AutomationFunction

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

Table 122 shows all attributes of TCSCController.

Table 122 – Attributes of SteadyStateInstructionProfile::TCSCController

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

3.130 (NC,Description) ThyristorControlledSeriesCompensator

Inheritance path = FACTSEquipment : RegulatingCondEq : Equipment

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 123 shows all attributes of ThyristorControlledSeriesCompensator.

Table 123 – Attributes of SteadyStateInstructionProfile::ThyristorControlledSeriesCompensator

name	mult	type	description
compensationZ	1..1	Impedance	(NC) The actual compensation impedance provided by the compensator. The attribute value shall be positive if compensation is in the capacitive range. The attribute value shall be negative if compensation is in the inductive rating.
currentSection	1..1	Integer	(NC) The current section on which the TCSC is operating.
q	1..1	ReactivePower	(NC) inherited from: FACTSEquipment
controlEnabled	1..1	Boolean	inherited from: RegulatingCondEq
inService	1..1	Boolean	inherited from: Equipment
networkAnalysisEnabled	0..1	Boolean	inherited from: Equipment

3.131 (NC,Description) VoltageAngleControlFunction

Inheritance path = FunctionBlock
Voltage angle control function is a function block that calculates operating point of the controlled equipment to achieve the target voltage angle.
Table 124 shows all attributes of VoltageAngleControlFunction.

Table 124 – Attributes of SteadyStateInstructionProfile::VoltageAngleControlFunction

name	mult	type	description
targetValue	1..1	AngleDegrees	(NC) Target value for the voltage angle that the control function is calculating to achieve by adjusting the operational setting to the controlled equipment.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.132 (NC,Description) VoltageAngleLimit root class

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 125 shows all attributes of VoltageAngleLimit.

Table 125 – Attributes of SteadyStateInstructionProfile::VoltageAngleLimit

name	mult	type	description
value	1..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).

3.133 (NC,Description) VoltageControlFunction

Inheritance path = FunctionBlock
Voltage control function is a function block that calculate the operating point of the controlled equipment to achieve the target voltage.
Table 126 shows all attributes of VoltageControlFunction.

Table 126 – Attributes of SteadyStateInstructionProfile::VoltageControlFunction

name	mult	type	description
targetValue	1..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.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

3.134 (NC,Description) VoltageInjectionControlFunction

Inheritance path = FunctionBlock

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

Table 127 shows all attributes of VoltageInjectionControlFunction.

Table 127 – Attributes of SteadyStateInstructionProfile::VoltageInjectionControlFunction

name	mult	type	description
targetValue	1..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.
enabled	1..1	Boolean	(NC) inherited from: FunctionBlock

Annex A (informative): Sample data

A.1 General

This Annex is designed to illustrate the profile by using fragments of sample data. It is not meant to be a complete set of examples covering all possibilities of using the profile. Defining a complete set of test data is considered a separate activity to be performed for the purpose of setting up interoperability testing and conformity related to this profile.

A.2 Sample instance data

Test data files are available in the CIM EG SharePoint.