**3GPP TSG-SA5 Meeting #136e *S5-212121rev1***

**e-meeting 1st - 9th March 2021**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **28.536** | **CR** | **-** | **rev** | **-** | **Current version:** | **16.2.1** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **x** | Core Network | **x** |

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|  |
| ***Title:***  | Input to draftCR Add assurance policy for closed control loop |
|  |  |
| ***Source to WG:*** | Huawei |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** | eCOSLA |  | ***Date:*** | 2021-01-08 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | Authorized consumer of a closed control loop should be allowed to configure assurance policy for a closed control loop.Policy defines a set of conditions and the corresponding actions that the authorized consumer can expect the behaviour of a closed control loop. In TS 28.535, there are serveral requirements related to policies for ACCL, e.g. REQ-CSA\_RR-CON-01 defines service load threshold and scaling up resource for service assurance, REQ-CSA-CON-09 defines the corrective actions against the root cause identified, REQ-CSA-CON-17 defines the condition to eanble/disable ACCL, 6.1.7 defines the conditions for ACCL state transition etc. Some policy definition examples can refer to TS 28.311, TS 28.628, TS 28.555, TS 28.556 etc. |
|  |  |
| ***Summary of change:*** | Introduce assurance policy for governance of closed control loops. |
|  |  |
| ***Consequences if not approved:*** | Communication service assurance by closed control loops will not be supported. |
|  |  |
| ***Clauses affected:*** | 4.1.2.2.1, 4.1.2.2.2, 4.1.2.3.1.1, 4.1.2.3.x (new), 4.1.2.4.1, B.2.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | This is input to the Rel-17 28.536 DraftCR for eCOSLA |
|  |  |
| ***This CR's revision history:*** |  |

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| **1st of changes** |

### 4.1.2 Model

#### 4.1.2.1 Imported and associated information entities

##### 4.1.2.1.1 Imported information entities and local labels

|  |  |
| --- | --- |
| Label reference | Local label  |
| TS 28.622 [5], IOC, Top | Top |

##### 4.1.2.1.2 Associated information entities and local labels

|  |  |
| --- | --- |
| Label reference | Local label  |
| TS 28.622 [5], IOC, SubNetwork | SubNetwork |
| TS 28.541 [6], IOC, NetWorkSlice | NetworkSlice |
| TS 28.541 [6], IOC, NetWorkSliceSubnet | NetworkSliceSubnet |
| TS 28.622 [5], IOC, ManagedElement | ManagedElement |
| TS 28.623 [16], datatype, AttributeNameValuePairSet | AttributeNameValuePairSet |
| TS 28.541 [6], dataType, ServiceProfile  | ServiceProfile |
| TS 28.541 [6], dataType, SliceProfile | SliceProfile |
| TS 28.541 [6], attribute, serviceProfileId | serviceProfileId |
| TS 28.541 [6], attribute, sliceProfileId | sliceProfileId |
| TS 28.623 [16], attribute, operationalState | operationalState |
| TS 28.623 [16], attribute, administrativeState | administrativeState |

#### 4.1.2.2 Class diagram

#### 4.1.2.2.1 Relationships

This clause depicts the set of classes that encapsulates the information relevant for this MnS. This clause provides an overview of the relationships between relevant classes in UML.



Figure 4.1.2.2.1.1: Assurance management NRM fragment

**Editor’s NOTE**: This will be revisited.There may be only some of the policy types related to assurance goal, while other policy types may be irrelevant. The mapping may be 0..1 to \* between AssurancePolicy and AssuranceGoal. .

#### 4.1.2.2.2 Inheritance



Figure 4.1.2.2.2.1: Assurance management inheritance relationships

#### 4.1.2.3 Class definitions

##### 4.1.2.3.1 AssuranceClosedControlLoop

4.1.2.3.1.1 Definition

This IOC represents assurance closed control loop, an assurance closed control loop monitors and adjusts the resources associated with a NetworkSlice or NetworkSliceSubnet in order to meet the objectives described by one or more assurance goals. The capabilities include:

-

- to report achievement of the goal fulfilment of an AssuranceClosedControlLoop

- state management of an AssuranceClosedControlLoop

- to keep track of the lifecycle of an AssuranceClosedControlLoop

- to operate according to assurance policy of an AssuranceClosedControlLoop

A consumer can check the effectiveness of the assuranceClosedControlLoop by consulting the performance measurements [12] and KPI’s [13] associated with the target and comparing values of the targets with the values of the characteristics related attributes reported by the performance assurance service.

4.1.2.3.1.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| operationalState | M | T | F | F | T |
| administrativeState | M | T | T | F | T |
| controlLoopLifeCyclePhase | M | T | T | F | T |

4.1.2.3.1.3 Constraints

No constraints have been defined for this document.

4.1.2.3.1.4 Notifications

The common notifications defined in clause 4.1.2.5 are valid for this IOC, without exceptions or additions.

##### 4.1.2.3.2 AssuranceGoal

4.1.2.3.2.1 Definition

This class represents the subset of attributes (typically characteristics attributes) from an SLS, i.e. a ServiceProfile or a SliceProfile, that are subject to assurance requirements. A single instance of AssuranceGoal represents a list of assurance targets. The assurance goal includes information about the time a goal should be observed and the status of the the goal fulfilment

NOTE: A NetworkSlice or NetworkSliceSubnet can support multiple instances of AssuranceGoal.

4.1.2.3.2.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| assuranceTargetList | M | T | F | F | T |
| sliceProfileId | CM | T | T | F | T |
| serviceProfileId | CM | T | T | F | T |
| observationTime | M | T | T | F | T |
| AssuranceGoalStatusObserved | O | T | F | F | T |
| AssuranceGoalStatusPredicted | O | T | F | F | T |
| **Attributes related to role** |  |  |  |  |  |
| networkSliceRef | CM | T | T | F | T |
| networkSliceSubnetRef | CM | T | T | F | T |

.

4.1.2.3.2.3 Attribute constraints

|  |  |
| --- | --- |
| Name | Definition |
| sliceProfileId | Condition: the AssuranceGoal applies to a NetworkSliceSubNet |
| serviceProfileId | Condition: the AssuranceGoal applies to a NetworkSlice |
| networkSliceSubnet | Condition: the AssuranceGoal applies to a NetworkSliceSubNet |
| networkSlice | Condition: the AssuranceGoal applies to a NetworkSlice |

4.1.2.3.2.4 Notifications

The common notifications defined in subclause 4.1.2.5 are valid for this IOC, without exceptions or additions.

##### 4.1.2.3.3 Void

##### 4.1.2.3.4 Void

##### 4.1.2.3.5 AssuranceTarget <<dataType>>

4.1.2.3.5.1 Definition

This data type represents a single attribute name-value-pair of which one or more are included in an AssuranceGoal.

4.1.2.3.5.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| assuranceTargetname-value-pair | M | T | F | F | T |

4.1.2.3.5.3 Attribute constraints

No constraints have been defined for this document.

4.1.2.3.5.4 Notifications

The common notifications defined in clause 4.1.2.5 are valid for the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

##### 4.1.2.3.x AssurancePolicy <<IOC>>

4.1.2.3.x.1 Definition

This class represents the attributes (typically characteristics attributes) of assurance policy, i.e., policies (conditions and actions) to govern ACCL operations in order to achieve AssuranceGoal of AssuranceClosedControlLoop. Some policy examples are conditions and ACCL state transition, load threshold and resource scaling, threshold and ACCL enable/disable etc.

4.1.2.3.x.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| policyId | M | T | T | F | T |
| policyPriority | O | T | T | F | T |
| policyStatus | O | T | T | F | T |
| policyType | M | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
| policyContentRef | M | T | T | F | T |

**Editor’s NOTE x1:** New attributes are FFS.

4.1.2.3.x.3 Attribute constraints

Editor’s NOTE: The AssurancePolicy may be extended according to new use cases and requirements, FFS for constraints to be applied.

4.1.2.3.x.4 Notifications

The common notifications defined in subclause 4.1.2.5 are valid for this IOC, without exceptions or additions.

##### 4.1.2.3.y PolicyContent <<IOC>>

4.1.2.3.y.1 Definition

This class represents the attributes (typically characteristics attributes) of policy content. It consists of conditions and actions applied for the managed object of an ACCL, e.g. operations or constraints for the resources or services of an ACCL.

4.1.2.3.y.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| condition | M | T | T | F | T |
| actionList | M | T | T | F | T |
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**Editor’s NOTE y1:** New attributes are FFS.

4.1.2.3.y.3 Attribute constraints

Editor’s NOTE: The PolicyContent may be extended according to new use cases and requirements, FFS for constraints to be applied.

4.1.2.3.y.4 Notifications

The common notifications defined in subclause 4.1.2.5 are valid for this IOC, without exceptions or additions.

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#### 4.1.2.4 Attribute definitions

##### 4.1.2.4.1 Attribute properties

The following table defines the properties of attributes that are specified in the present document.

Table 4.1.2.4.1.1

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| controlLoopLifeCyclePhase | It indicates the lifecycle phase of the AssuranceClosedControlLoop instance. AllowedValues: Preparation, Commissioning, Operation and Decommissioning.  | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NULL isNullable: False |
| assuranceTargetName | The name of the attribute which is part of a name-value-pair in the AssuranceTargetList.The assuranceTargetName shall be equal to the name of an attribute in the relevant ServiceProfile or SliceProfile. The relevant ServiceProfile or SliceProfile is identified by the attribute serviceProfileId or sliceProfileId in the AssuranceGoal. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| assuranceTargetValue | The value of the attribute which is part of a name-value-pair in the AssuranceTargetList | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| assuranceTargetList | This is an attribute containing a list of name-value-pairs that are part of an AssuranceTargetList | type: Attribute name/value pairmultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| observationTime | It indicates the time duration over which an AssuranceGoal is observed. The observation time is expressed in seconds. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| operationalState | It indicates the operational state of the assurance control loop. It describes whether the resource is physically installed and working.allowedValues: "ENABLED", "DISABLED".The meaning of these values is as defined in 3GPP TS 28.625 [14] and ITU-T X.731 [15]. | type: ENUM multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: DisabledallowedValues: N/AisNullable: False |
| administrativeState | It indicates the administrative state of the assurance control loop. It describes the permission to use or prohibition against using the instance, imposed through the OAM services.allowedValues: “LOCKED”, “UNLOCKED”, The meaning of these values is as defined in 3GPP TS 28.625 [14] and ITU-T X.731 [15]. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: LockedallowedValues: N/A isNullable: False |
| assuranceGoalStatusObserved | It holds the status of the observed goal fulfilment to the assuranceGoal allowedValues: "FULFILLED", “NOT\_FULFILLED  | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| assuranceGoalStatusPredicted | It holds the status of the predicted future goal fulfilment to the assuranceGoal allowedValues: "FULFILLED", “NOT\_FULFILLED" | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| policyPriority | It specifies the priority of the policy.allowedValues: "HIGH", “MEDIUM", "LOW" | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: High, Medium, LowisNullable: True |
| policyStatus | It specifies the status of Policy.allowedValues: "ACTIVE", "DEACTIVE" | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: active, deactiveisNullable: True |
| policyType | It identifies policy types for specific purposes or scenarios for ACCL operations.Example of allowedValues: "GOALFULFILMENT", "GOVERNANCE", "COORDINATION" | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
|  |  |  |
|  |  |  |
| condition | It specifies the condition which will trigger the related ACCL actions, e.g. load threshold | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| actionList | It specifies the ACCL assurance related actions, e.g. state transition | type: String multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: DisabledallowedValues: N/AisNullable: False |
|  |  |  |
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|  |  |  |
| policyContentRef | It holds the reference to the PolicyContent instance subject to assurance policy. | type: Dnmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| networkSliceRef | It holds the reference to the NetworkSlice instance subject to assurance requirements | type: Dnmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| networkSliceSubnetRef | It holds the reference to the NetworkSliceSubnet instance subject to assurance requirements | type: Dnmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| operationalState | It indicates the operational state of the AssuranceClosedControlLoop instance. It describes whether the resource is installed and partially or fully operable (Enabled) or the resource is not installed or not operable (Disabled).Allowed values; Enabled/DisabledallowedValues: "ENABLED", "DISABLED".The meaning of these values is as defined in 3GPP TS 28.625 [14] and ITU-T X.731 [15]. | type: ENUM multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: DisabledallowedValues: Enabled, DisabledisNullable: False |
| administrativeState | It indicates the administrative state of the AssuranceClosedControlLoop instance. It describes the permission to use or the prohibition against using the AssuranceClosedControlLoop instance. The administrative state is set by the MnS consumer. Allowed values; Locked/UnlockedallowedValues: "LOCKED", "UNLOCKED".The meaning of these values is as defined in 3GPP TS 28.625 [14] and ITU-T X.731 [15]. | type: ENUM multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: LockedallowedValues: Locked, UnlockedisNullable: False |
| NOTE 1: VoidNOTE 2: Void |

##### 4.1.2.4.2 Constraints

No constraints have been identified for this document.

##### 4.1.2.4.3 Notifications

This subclause presents a list of notifications, defined in [7], that provisioning management service consumer can receive. The notification parameter objectClass/objectInstance, defined in [10], would capture the DN of an instance of an IOC defined in the present document.

#### 4.1.2.5 Common notifications

##### 4.1.2.5.1 Alarm notifications

This clause presents a list of notifications, defined in TS 28.532 [7], that an MnS consumer may receive. The notification header attribute objectClass/objectInstance, defined in TS 32.302 [8], shall capture the DN of an instance of a class defined in the present document.

| Name | Qualifier | Notes |
| --- | --- | --- |
| notifyNewAlarm | M | -- |
| notifyClearedAlarm | M | -- |
| notifyAckStateChanged | M | -- |
| notifyAlarmListRebuilt | M | -- |
| notifyChangedAlarm | O | -- |
| notifyCorrelatedNotificationChanged | O | -- |
| notifyChangedAlarmGeneral | O | -- |
| notifyComments | O | -- |
| notifyPotentialFaultyAlarmList | O | -- |

##### 4.1.2.5.2 Configuration notifications

This clause presents a list of notifications, defined in TS 28.532 [7], that an MnS consumer may receive. The notification header attribute objectClass/objectInstance, defined in TS 32.302 [8], shall capture the DN of an instance of a class defined in the present document.

| Name | Qualifier | Notes |
| --- | --- | --- |
| notifyMOICreation | O | -- |
| notifyMOIDeletion | O | -- |
| notifyMOIAttributeValueChanges | O | -- |
| notifyEvent | O | -- |

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| **2nd of changes** |

Annex B (normative):
OpenAPI definition of the COSLA NRM

# B.1 General

This annex contains the OpenAPI definition of the COSLA NRM in YAML format.

The Information Service (IS) of the COSLA NRM is defined in clause 4.

Mapping rules to produce the OpenAPI definition based on the IS are defined in TS 32.160 [10].

# B.2 Solution Set (SS) definitions

## B.2.1 OpenAPI document "coslaNrm.yml"

Editor’s NOTE: Stage 3 of the IOC AssurancePolicy will be introduced later when its stage 2 is stable.

openapi: 3.0.2

info:

 title: coslaNrm

 version: 16.4.0

 description:

 OAS 3.0.1 specification of the Cosla NRM

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externalDocs:

 description: 3GPP TS 28.536 V16.4.0; 5G NRM, Slice NRM

 url: http://www.3gpp.org/ftp/Specs/archive/28\_series/28.536/

paths: {}

components:

 schemas:

#------------ Type definitions ---------------------------------------------------

 ControlLoopLifeCyclePhase:

 - type: string

 enum:

 - PREPARATION

 - COMMISSIONING

 - OPERATION

 - DECOMMISSIONING

 ObservationTime:

 type: integer

 AssuranceGoalStatusObserved:

 type: string

 enum:

 - FULFILLED

 - NOT\_FULFILLED

 AssuranceGoalStatusPredicted:

 type: string

 enum:

 - FULFILLED

 - NOT\_FULFILLED

 AssuranceTarget:

 type: array

 items:

 $ref: 'comDefs.yaml#/components/schemas/AttributeNameValuePairSet'

 AssuranceTargetList:

 type: array

 items:

 $ref: '#/components/schemas/AssuranceTarget'

#-------- Definition of concrete IOCs --------------------------------------------

 SubNetwork-Single:

 allOf:

 - $ref: 'genericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - $ref: 'genericNrm.yaml#/components/schemas/SubNetwork-Attr'

 - $ref: 'genericNrm.yaml#/components/schemas/SubNetwork-ncO'

 - type: object

 properties:

 AssuranceClosedControlLoop:

 $ref: '#/components/schemas/AssuranceClosedControlLoop-Multiple'

 ManagedElement-Single:

 allOf:

 - $ref: 'genericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - $ref: 'genericNrm.yaml#/components/schemas/ManagedElement-Attr'

 - $ref: 'genericNrm.yaml#/components/schemas/ManagedElement-ncO'

 - type: object

 properties:

 AssuranceClosedControlLoop:

 $ref: '#/components/schemas/AssuranceClosedControlLoop-Multiple'

 AssuranceClosedControlLoop-Single:

 allOf:

 - $ref: 'genericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 type: object

 properties:

 operationalState:

 $ref: comDefs.yaml'#/components/schemas/OperationalState'

 administrativeState:

 $ref: comDefs.yaml'#/components/schemas/AdministrativeState'

 controlLoopLifeCyclePhase:

 $ref: '#/components/schemas/ControlLoopLifeCyclePhase'

 AssuranceGoal:

 $ref: '#/components/schemas/ AssuranceClosedControlLoop-Multiple'

 AssuranceGoal-Single:

 allOf:

 - $ref: 'genericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - type: object

 properties:

 observationTime:

 $ref: '#/components/schemas/ObservationTime'

 assuranceTargetList:

 $ref: '#/components/schemas/AssuranceTargetList'

 assuranceGoalStatusObserved:

 $ref: '#/components/schemas/AssuranceGoalStatusObserved'

 assuranceGoalStatusPredicted:

 $ref: '#/components/schemas/AssuranceGoalStatusPredicted'

 serviceProfileId:

 $ref: 'sliceNrm.yaml#/components/schemas/ServiceProfileId'

 sliceProfileId:

 $ref: 'sliceNrm.yaml#/components/schemas/SliceProfileId'

 networkSliceRef:

 $ref: 'genericNrm.yaml#/components/schemas/Dn'

 networkSliceSubnetRef:

 $ref: 'genericNrm.yaml#/components/schemas/Dn'

#-------- Definition of JSON arrays for name-contained IOCs ----------------------

 AssuranceClosedControlLoop-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/AssuranceControlLoop-Single'

 AssuranceGoal-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/AssuranceGoal-Single'

#------------ Definitions in TS 28.541 for TS 28.623 -----------------------------

 resources-coslaNrm:

 oneOf:

 - $ref: '#/components/schemas/AssuranceClosedControlLoop-Single'

 - $ref: '#/components/schemas/AssuranceGoal-Single'

 - $ref: 'genericNrm.yaml/components/schemas/Subnetwork-Single'

 - $ref: 'genericNrm.yaml/components/schemas/ManagedElement-Single'

|  |
| --- |
| **End of changes** |