**3GPP TSG- Meeting # *206049***

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  |
| *For* [***HELP***](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:***  |  |
|  |  |
| ***Source to WG:*** | , Huawei |
| ***Source to TSG:*** | SA5 |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | The following issues where identified in discussion paper XXX- The association relationship between SubNetwork and AssuranceControlLoop.- The relationship between the AssuranceControlLoop and Managed Entities- The difference between AssuranceGoalStatus and AssuranceGoal- attribute definitions for operationalState and administrativeState are missing |
|  |  |
| ***Summary of change:*** | - added association relationship between SubNetwork and AssuranceControlLoop - added assicioation between NetworkSlice and AssuranceControlLoop- removed AssuranceGoalStatus and added new description for AssuranceGoal- updated attribute definitions accordingly- added attribute definitions for operationalState and administrativeState |
|  |  |
| ***Consequences if not approved:*** | The model is ambiguous and open to misinterpretation leading to potentially faulty implementations |
|  |  |
| ***Clauses affected:*** | 2, 4.1.2.1.1, 4.1.2.2.1, 4.1.2.2.1, 4.1.2.3.1.1, 4.1.2.3.2, 4.1.2.3.2.1, 4.1.2.3.2.2, 4.1.2.3.2.3, 4.1.2.3.2.44.1.2.3.3, 4.1.2.3.3.1, 4.1.2.3.3.2, 4.1.2.3.3.3, 4.1.2.3.3.44.1.2.3.4, 4.1.2.3.4.1, 4.1.2.3.4.44.1.2.4.1, 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:*** | <https://forge.3gpp.org/rep/sa5/MnS/tree/S5-206049_-_COSLA_-_draf_CR_Implement_assurance_closed_loop_model_changes> |
|  |  |
| ***This CR's revision history:*** | S5-205244rev4 converted to draftCR as input to CR for #134e |

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| **First change** |

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] ETSI GS ZSM 002 (V1.1.1) (2019-08): "Zero-touch network and Service Management (ZSM); Reference Architecture".

[3] 3GPP TS 28.550: "Management and orchestration; Performance assurance".

[4] 3GPP TS 28.545: "Management and orchestration; Fault Supervision (FS)".

[5] 3GPP TS 28.622: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[6] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

[7] 3GPP TS 28.532: "Management and orchestration; Generic management services".

[8] 3GPP TS 32.302: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP); Information Service (IS)".

[9] 3GPP TS 28.531: "Management and orchestration; Provisioning".

[10] 3GPP TS 32.160: "Management and orchestration; Management service template".

[11] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".

[12] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[13] 3GPP TS 28.554: "Management and orchestration; 5G end to end Key Performance Indicators (KPI)".

[x] 3GPP TS 28.625: "State Management Data Definition Integration Reference Point (IRP); Information Service (IS)".

[y] ITU-T Recommendation X.731: "Information technology - Open Systems Interconnection - Systems Management: State management function".

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| **Second change** |

### 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 |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

##### 4.1.2.1.1 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 28.541 [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 |

#### 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

#### 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 the capabilities of a closed control loop, these include:

- to monitor the adjustments of the resources associated with a NetworkSlice or NetworkSliceSubnet in order to meet the objectives described by one or more AssuranceGoals

- state management of an AssuranceClosedControlLoop

- to keep track of the lifecycle of an AssuranceClosedControlLoop

A consumer can check the effectiveness of the assuranceControlLoop 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 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
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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.

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 |
| observationTimePeriod | M | T | T | F | T |
| assuranceGoalStatusObserved | O | T | F | F | T |
| assuranceGoalStatusPredicted | O | T | F | 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 |

4.1.2.2.3.4 Notifications

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

##### 4.1.2.3.1 ACCLManagedEntity <<ProxyClass>>

4.1.2.3.1.1 Definition

This IOC represents an <<IOC>> SubNetwork, <<IOC>> NetworkSlice, or an <<IOC>> NetworkSliceSubnet or an <<IOC>> ManagedElement. The AssuranceGoal is not specified in present document.

When <<ProxyClass>> ACCLManagedEntity represents an <<IOC>> SubNetwork an instance of <<IOC>> AssuranceClosedControlLoop represents the closed loop control information for a SubNetwork instance. The <<IOC>> AssuranceGoal represents a subset of attributes specified in a ServiceProfile

When <<ProxyClass>> ACCLManagedEntity represents an <<IOC>> NetworkSlice an instance of <<IOC>> AssuranceClosedControlLoop represents the closed loop control information for a NetworkSlice instance. The <<IOC>> AssuranceGoal represents a subset of attributes specified in a SliceProfile

When <<ProxyClass>> ACCLManagedEntity represents an <<IOC>> NetworkSliceSubnet an instance of <<IOC>> AssuranceClosedControlLoop represents the closed loop control information for a NetworkSliceSubnet instance. The <<IOC>> AssuranceGoal represents a subset of attributes specified in a SliceProfile

When <<ProxyClass>> ACCLManagedEntity represents an <<IOC>> ManagedElement an instance of <<IOC>> AssuranceClosedControlLoop represents the closed loop control information for a ManagedElement instance. The AssuranceGoal is not specified in present document.

#### 4.3.24.2 Attributes

When <<IOC>> NetworkSlice is used, the attributes are defined in [6].

When <<IOC>> NetworkSliceSubnet is used, the attributes are defined in [6].

When <<IOC>> ManagedElement is used, the attributes are defined in [5].

####  4.3.24.3 Attribute constraints

When <<IOC>> NetworkSlice is used, the attributes constraints are defined in [6].

When <<IOC>> NetworkSliceSubnet is used, the attributes constraints are defined in [6].

When <<IOC>> ManagedElement is used, the attributes constraints are defined in [5].

####  4.3.24.4 Notifications

When <<IOC>> NetworkSlice is used, the notifications are defined in [6].

When <<IOC>> NetworkSliceSubnet is used, the notifications are defined in [6].

When <<IOC>> ManagedElement is used, the notifications are defined in [5].

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##### 4.1.2.3.4 ObservationTimePeriod <<dataType>>

4.1.2.3.4.1 Definition

This datatype represents the time interval that the achievement of the goal’s objective is observed which can be specified in seconds, minutes, hours or days. The ObservationTimePeriod is the requirement from an AssuranceGoal to an AssuranceClosedControlLoop.

NOTE: The smallest ObservationTimePeriod of all AssuranceGoals associated with the same AssuranceClosedControlLoop applies.

4.1.2.3.4.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| observationTime | M | T | T | F | T |
| timeUnit | M | T | T | F | T |

4.1.2.3.3.3 Attribute constraints

No constraints have been defined for this document.

4.1.2.3.3.4 Notifications

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

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

4.1.2.3.5.1 Definition

This data type represents a single attribute and its value that are included in an AssuranceGoal.

4.1.2.3.5.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| assuranceTargetName | M | T | T | F | T |
| assuranceTargetValue | 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 subclause 4.1.2.5 are valid for the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

#### 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 AssuranceControlLoop 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 key-value-pair in the AssuranceGoal | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| assuranceTargetValue | The value of the attribute which is part of a key-value-pair in the AssuranceGoal | type: Numbermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| assuranceTargetList | This is an attribute containing a list of key-value-pairs that are part of an AssuranceGoal | type: AssuranceTargetmultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| assuranceGoalReference | A unique identifier of the assurance goal that should be supported by the AssuranceClosedControlLoop. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
|  |  |  |
| observationTime | It indicates the observation time expressed in number of timeUnits.  | type: Integer multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| timeUnit | It indicates the unit of time used to express the observationTimeAllowedValues: second, minute, hour, dayEditor’s note: the use of other values expressing units larger than days or smaller than seconds (i.e. ms) is FFS | type: ENUMmultiplicity: 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 [x] and ITU-T X.731 [y]. | 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 [x] and ITU-T X.731 [y]. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: LockedallowedValues: N/A isNullable: False |

##### 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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| **Second change** |

***The YAML is not yet updated for the changes in this document***

# B.2 Solution Set (SS) definitions

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

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

 OperationalState:

 - type: string

 enum:

 - ENABLED

 - DISABLED

 AdministrativeState:

 - type: string

 enum:

 - LOCKED

 - UNLOCKED

 ObservationTimePeriod:

 allOf:

 - $ref: '#/components/schemas/ObservationTimePeriod'

 - type: object

 properties:

 observationTime:

 type: integer

 timeUnit:

 - type: string

 enum:

 - SECOND

 - MINUTE

 - HOUR

 - DAY

 AssuranceGoalStatusObserved:

 type: string

 enum:

 - COMPLIANT

 - NON COMPLIANT

 AssuranceGoalStatusPredicted:

 type: string

 enum:

 - COMPLIANT

 - NON COMPLIANT

 AssuranceGoal:

 allOf:

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

 - type: object

 properties:

 observationTimePeriod:

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

 assuranceTargetList:

 type: array

 items:

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

 assuranceGoalStatusObserved:

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

 assuranceGoalStatusPredicted:

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

 serviceProfileId:

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

 sliceProfileId:

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

 ACCLProxy:

 type: object

 items:

 oneOf:

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

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

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

 AssuranceClosedControlLoop:

 allOf:

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

 - type: object

 properties:

 attributes:

 allOf:

 - $ref: '#/components/schemas/ACCLProxy'

 - type: object

 - properties:

 operationalState:

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

 administrativeState:

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

 closedControlLoopLifeCyclePhase:

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

 NetworkSlice:

 allOf:

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

 - type: object

 properties:

 attributes:

 allOf:

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

 - type: object

 properties:

 assuranceClosedControlLoops:

 type: array

 items:

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

 NetworkSliceSubnet:

 allOf:

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

 - type: object

 properties:

 attributes:

 allOf:

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

 - type: object

 properties:

 assuranceClosedControlLoops:

 type: array

 items:

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

 ManagedElement:

 allOf:

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

 - type: object

 properties:

 attributes:

 allOf:

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

 - type: object

 properties:

 assuranceClosedControlLoops:

 type: array

 items:

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

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

 resources-coslaNrm:

 oneOf:

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