**3GPP TSG-SA5 Meeting #137e *S5-213528***

**e-meeting 10th - 19th May 2021**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **28.536** | **CR** | **-** | **rev** | **-** | **Current version:** | **16.3.0** |  |
|  | | | | | | | | |
| *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 report for closed control loop | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eCOSLA | | | | |  | ***Date:*** | | | 2021-04-26 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **C** |  | | | | | ***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 can be 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:*** | | AssuranceGoal represents the subset of attributes (typically characteristics attributes) from an SLS, i.e. a ServiceProfile or a SliceProfile, that are subject to assurance requirements. It is used for the ACCL MnS consumer to input goals for the MnS producer. Assurance goal fulfilment status represents the status of the Assurance goal for the observationTime, i.e. AssuranceGoalStatusObserved and AssuranceGoalStatusPredicted in this release of specification . It is used for the ACCL MnS consumer to observe/monitor the status of the fulfilment of the AssuranceGoal and should be considered as report information of an ACCL. The AssuranceGoal should be used as input information for the MnS consumer. However, the Assurance goal fulfilment status is the information generated by the ACCL as output information for monitoring for the MnS consumer.  In addition to the assurance goal fulfilment result for the corresponding observationTime, the authorized consumer of a closed control loop should be allowed to monitor some ACCL governance behaviour in an assurance report based on service exposure agreements. Some examples could be ACCL coordination actions and results, ACCL modification actions and results, associated policies for the goverance operations, root cause or analytical information related to the ACCL governance etc. Therefore the MnS consumer may have more hints on how to adjust the assurance goal, assurance policies or configurations for the ACCL according to the assurance report. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce AssuranceReport IOC to accommodate the Assurance goal fulfilment status of a closed control loop, and potentially ACCL goverance operations, results, related analytical information etc. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | From the ACCL MnS consumer perspective, the input information and output information of an ACCL was mixed up. It also lacks flexibility for future extention. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.1.2.2.1, 4.1.2.2.2, 4.1.2.3.1.1, 4.1.2.3.2.2, 4.1.2.3.m (new), 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 28.541 [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

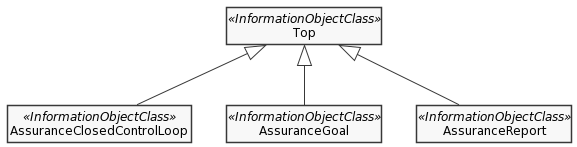


Figure 4.1.2.2.2.1: Assurance management inheritance relationships

#### 4.1.2.3 Class definitions

##### 4.1.2.3.1 AssuranceClosedControlLoop

4.1.2.3.1.1 Definition

This IOC represents 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:

- state management of an AssuranceClosedControlLoop

- to keep track of the lifecycle 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. .

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 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **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 |
| networkSliceSubnetRef | Condition: the AssuranceGoal applies to a NetworkSliceSubNet |
| networkSliceRef | 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 | M | T | F | 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 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.m AssuranceTargetStatus <<dataType>>

4.1.2.3.m.1 Definition

This data type represents the observed or predicted target fulfilment status.

4.1.2.3.m.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| assuranceTargetName | M | T | F | F | T |
| AssuranceTargetStatusObserved | O | T | F | F | T |
| AssuranceTargetStatusPredicted | O | T | F | F | T |

4.1.2.3.m.3 Attribute constraints

No constraints have been defined for this document.

4.1.2.3.m.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 AssuranceReport <<IOC>>

4.1.2.3.x.1 Definition

This class represents the attributes (typically characteristics attributes) of assurance report, e.g, the information about the status of the the goal fulfilment, etc. It may also contain some related information which is generated by an ACCL for monitoring by the MnS consumer, e.g. ACCL governance operations and results etc. .

Editor’s NOTE 1: It is FFS for ACCL governance operations and results to be reported or monitored, some examples could be ACCL coordination actions and results, ACCL modification actions and results, associated policies for the operations, root cause or analytical information related to the ACCL governance etc.

Editor’s NOTE 2: The IOC name “AssuranceReport” is not agreed yet. Alternatives are for example “AssuranceStatus” or “AssuranceMonitor”.

4.1.2.3.x.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| observationTime | M | T | T | F | T |
|  |  |  |  |  |  |
| assuranceGoalStatusObserved | O | T | F | F | T |
| assuranceGoalStatusPredicted | O | T | F | F | T |
|  |  |  |  |  |  |
| assuranceTargetStatusList | O | T | F | F | T |

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

4.1.2.3.x.3 Attribute constraints

Editor’s NOTE: The AssuranceReport 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.







#### 4.1.2.4 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: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: NULL  isNullable: False |
| assuranceTargetName | The name of the attribute which is part of AssuranceTarget.  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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| assuranceTargetValue | The value of the attribute which is part of AssuranceTarget | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| assuranceTargetList | This is an attribute containing a list of AssuranceTarget(s) that are part of an AssuranceGoal | type: AssuranceTarget  multiplicity: 1..\*  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| observationTime | It indicates the time duration over which an AssuranceGoal is observed.  The observation time is expressed in seconds. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| assuranceGoalStatusObserved | It holds the status of the observed goal fulfilment to the assuranceGoal  allowedValues: "FULFILLED", “NOT\_FULFILLED | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| assuranceGoalStatusPredicted | It holds the status of the predicted future goal fulfilment to the assuranceGoal  allowedValues: "FULFILLED", “NOT\_FULFILLED" | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| networkSliceRef | It holds the reference to the NetworkSlice instance subject to assurance requirements | type: Dn  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| networkSliceSubnetRef | It holds the reference to the NetworkSliceSubnet instance subject to assurance requirements | type: Dn  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: 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/Disabled  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: 1  isOrdered: N/A  isUnique: N/A  defaultValue: Disabled  allowedValues: Enabled, Disabled  isNullable: 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/Unlocked  allowedValues: "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: 1  isOrdered: N/A  isUnique: N/A  defaultValue: Locked  allowedValues: Locked, Unlocked  isNullable: False |
| NOTE 1: Void  NOTE 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** |

# B.2 Solution Set (SS) definitions

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

Editor’s NOTE: Stage 3 of the IOC AssuranceReport 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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All rights reserved.

externalDocs:

description: 3GPP TS 28.536 V16.4.0; Cosla 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: object

properties:

assuranceTargetName:

type: string

assuranceTargetValue:

type: string

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/AssuranceGoal-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:

type: string

sliceProfileId:

type: string

networkSliceRef:

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

networkSliceSubnetRef:

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

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

AssuranceClosedControlLoop-Multiple:

type: array

items:

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

AssuranceGoal-Multiple:

type: array

items:

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

#------------ Definitions in TS 28.536 for TS 28.623 -----------------------------

resources-coslaNrm:

oneOf:

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

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

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

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

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