3GPP TSG SA WG5 Meeting 136-e TDoc S5-212220

electronic meeting, online, 1 - 9 March 2021

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **28.541** | **CR** | **0465** | **rev** | **-** | **Current version:** | **15.7.0** |  |
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| *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:***  | Correction to NSI and NSSI state management |
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| ***Source to WG:*** | S5 |
| ***Source to TSG:*** | Huawei, Orange, Telefónica |
|  |  |
| ***Work item code:*** | NETSLICE-5GNRM |  | ***Date:*** | 2021-03-01 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-15 |
|  | *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)* |
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| ***Reason for change:*** | The Network Resource Models for NetworkSlice and NetworkSliceSubnet do not follow the recommendations in X.731 for modelling of states.There is no description of dependencies between states of related objects. |
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| ***Summary of change:*** | Align state transitions with ITU-T Rec. X.731.Define the behaviour of operational state. |
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| ***Consequences if not approved:*** | Undefined behaviour will cause incompatible implementations. |
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| ***Clauses affected:*** | 6.4.1, B.1, B.2 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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| **1st change** |

### 6.4.1 Attribute properties

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| availability | This parameter specifies the availability requirement for an network slice instance, expressed as a percentage.  | type: Floatmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: True |
| serviceProfileId | A unique identifier of property of network slice related requirement should be supported by the network slice instance. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| sliceProfileId | A unique identifier of the property of network slice subnet related requirement should be supported by the network slice subnet instance. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| constituentNSSIIdList | It is a list of DN of MOI(s) for the constituent NSSI associated with the network slice subnet instance. | type: DNmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| mFIdList | It is a list of DN of the MOI(s) for the NF instances associated with the network slice subnet instance. | type: DNmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| operationalState | It indicates the operational state of the network slice instance or the network slice subnet instance. It describes whether or not the resource is physically installed and working.allowedValues: ENABLED, DISABLED.The meaning of these values is as defined in 3GPP TS 28.625 [17] and ITU-T X.731 [18]. | type: ENUM multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| administrativeState | It indicates the administrative state of the network slice instance or the network slice subnet instance. It describes the permission to use or prohibition against using the instance, imposed through the OAM services.allowedValues: LOCKED, UNLOCKED, SHUTTINGDOWN. The meaning of these values is as defined in 3GPP TS 28.625 [17] and ITU-T X.731 [18]. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: LOCKEDallowedValues: N/A isNullable: False |
| nsInfo | This attribute contains the NsInfo of the NS instance corresponding to the network slice subnet instance. The NsInfo is described in clause 8.3.3.2.2 of ETSI GS NFV-IFA 013 [29].The NsInfo contains:- nsInstanceId.- nsName (optional).- description (optional). | type: <<dataType>>multiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: No default valueisNullable: True |
| perfReq | This parameter specifies the requirements to the NSI in terms of the scenarios defined in the TS 22.261 [28], such as Experienced data rate, Area traffic capacity (density) information of UE density. It is a structure containing the following elements:- list of perfRequirementsDepending on the sST value, the list of perfRequirements will be- list of eMBBPerfReqor- list of uRLLCPerfReqor- list of mIoTPerfReqNOTE: the list of mIoTPerfReq is not addressed in the present document.allowedValues:- list of eMBBPerfReq is a list of entries where an entry identifies the performance requirements to the NSI in terms of the scenarios defined in the Table 7.1-1 of TS 22.261 [28]. An entry has the following attributes: expDataRateDL (Integer), expDataRateUL (Integer), areaTrafficCapDL (Integer), areaTrafficCapUL (Integer), userDensity (Integer), activityFactor (Integer), uESpeed (Integer), coverage (String) (see Table 7.1-1 of TS 22.261 [28]).- list of uRLLCPerfReq is a list of entries where an entry identifies the performance requirements to the NSI in terms of the scenarios defined in the Table 7.2.2-1 of TS 22.261 [28]. An entry has the following attributes: e2eLatency (Integer), jitter (Integer), survivalTime (Integer), cSAvailability (Float), reliability (Float), expDataRate (Integer), payloadSize (String), trafficDensity (Integer), connDensity (Integer), serviceAreaDimension (String) (see Table 7.2-1 of TS 22.261 [28]).NOTE: Limitation on attribute values in instances of ServiceProfile is not addressed in the present document. | type: <<dataType>>multiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| sNSSAIList | This parameter specifies the S-NSSAI list to be supported by the new NSI to be created or the existing NSI to be re-used.sNSSAList is defined in subclause 4.4.1 |  |
| maxNumberofUEs | An attribute specifies the maximum number of UEs may simultaneously access the network slice instance. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| coverageAreaTAList | An attribute specifies a list of <TrackingArea> where the NSI can be selected. | type: <<dataType>>multiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| latency | An attribute specifies the packet transmission latency (millisecond) through the RAN, CN, and TN part of 5G network and is used to evaluate utilization performance of the end-to-end network slice instance. See clause 6.3.1 of 28.554 [27]. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| uEMobilityLevel | An attribute specifies the mobility level of UE accessing the network slice instance. See 6.2.1 of TS 22.261 [28].allowedValues: STATIONARY, NOMADIC, RESTRICTED\_MOBILITY, FULLY\_MOBILITY | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: True |
| serviceProfile.resourceSharingLevel | An attribute specifies whether the resources to be allocated to the network slice instance may be shared with another network slice instance(s).allowedValues: SHARED, NON\_SHARED. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: YesisNullable: True |
| sliceProfile.resourceSharingLevel | An attribute specifies whether the resources to be allocated to the network slice subnet instance may be shared with another network slice subnet instance(s).allowedValues: SHARED, NON\_SHARED. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: YesisNullable: True |
| serviceProfileList | An attribute specifies a list of ServiceProfile (see clause 6.3.3) supported by the network slice instance | type: << dataType >>multiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| sliceProfileList | An attribute specifies a list of SliceProfile (see clause 6.3.4) supported by the network slice subnet instance | type: << dataType >>multiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| sST | This parameter specifies the slice/service type for a ServiceProfile..See clause 5.15.2 of 3GPP TS 23.501 [2]. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| NetworkSlice.networkSliceSubnetRef | This holds a DN of NetworkSliceSubnet relating to the NetworkSlice instance. | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| NetworkSliceSubnet.networkSliceSubnetRef | This holds a list of DN of constituent NetworkSliceSubnet supporting NetworkSliceSubnet instance  | type: DNmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| managedFunctionRef | This holds a list of DN of ManagedFunction instances supporting the NetworkSliceSubnet instance. | type: DNmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |

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| **2nd change** |

# B.1 NSI state handling

A NetworkSlice instance (NSI) is a logical object in the management system that represents a complex grouping of resources that may be in various states. At any time, the management system needs to know the state of an NSI.

The ITU-T X.731 [18], to which [17] refers, has defined the inter-relation between the administrative state and operational state of systems in general.

*administrativeState* **LOCKED**

*administrativeState***UNLOCKED**

*administrativeState***SHUTTING DOWN**

*operationalState***DISABLED**

*operationalState***ENABLED**

*operationalState***DISABLED**

*operationalState***ENABLED**

*operationalState***ENABLED**

0

1

3

2

1

2a

2

1

2

4

3

4

55

Initial and Final state

2b

Figure B.1: Combined NSI state diagram

The interactions specified under the column "The state transition events and actions" of "NSI state transition table" below shall be present for the state transition.

Table B.1: The NSI state transition table

|  |  |
| --- | --- |
| Trigger number | The state transition events and actions |
| 0 | Operation allocateNsi results in the creation of NSI. The administrative state is set to LOCKED and operationalState is set to DISABLED-- or –CM operation creates NSI.The administrative state is set to LOCKED and operationalState is set to DISABLED |
| 1 | CM operation sets administrative state to UNLOCKED |
|  |  |
| 2 | CM operation sets administrative state to LOCKED |
| 2a | CM operation sets administrative state to SHUTTING DOWN |
| 2b | The last user of the NSI stops using the NSI |
| 3 | The related NSSI (identified by NetworkSlice.networkSliceSubnetRef) changes state to UNLOCKED and ENABLED |
| 4 | The related NSSI (identified by NetworkSlice.networkSliceSubnetRef) changes state to LOCKED-- or –The related NSSI (identified by NetworkSlice.networkSliceSubnetRef) changes state to DISABLED |
| 5 | Operation deallocateNsi results in the deletion of NSI-- or –CM operation deletes NSI |

# B.2 State handling of NSSI

A NetworkSliceSubnet instance (NSSI) is a logical object in the management system that represents a complex grouping of resources that may be in various states. At any time the management system needs to know the state of an NSSI.

The ITU-T X.731 [18], to which [17] refers, has defined the inter-relation between the administrative state, operational state and usage state of systems in general.

*administrativeState* **LOCKED**

*administrativeState***UNLOCKED**

*administrativeState***SHUTTING DOWN**

*operationalState***DISABLED**

*operationalState***ENABLED**

*operationalState***DISABLED**

*operationalState***ENABLED**

*operationalState***ENABLED**

0

1

3

2

1

2a

2

1

2

4

3

4

55

Initial and Final state

2b

Figure B.2.1: Combined NSSI state diagram

The interactions specified under the column “The state transition events and actions” of “NSSI state transition table” below shall be present for the state transition.

Table B.2.1: The NSSI state transition table

|  |  |
| --- | --- |
| Trigger number | The state transition events and actions |
| 0 | Operation allocateNssi results in the creation of NSSI.The administrative state is set to LOCKED and operationalState is set to DISABLED-- or –CM operation creates NSSI.The administrative state is set to LOCKED and operationalState is set to DISABLED |
| 1 | CM operation sets administrative state to UNLOCKED |
|  |  |
| 2 | CM operation sets administrative state to LOCKED |
| 2a | CM operation sets administrative state to SHUTTING DOWN |
| 2b | The last user of the NSSI stops using the NSSI |
| 3 | All constituent NSSIs (identified by NetworkSliceSubnet.networkSliceSubnetRef) change state to UNLOCKED and ENABLED |
| 4 | At least one constituent NSSI (identified by NetworkSliceSubnet.networkSliceSubnetRef) changes state to LOCKED-- or –At least one constituent NSSI (identified by NetworkSliceSubnet.networkSliceSubnetRef) changes state to DISABLED |
| 5 | Operation deallocateNssi results in the deletion of NSSI-- or –CM operation deletes NSSI |

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| **End of changes** |