**3GPP TSG-SA5 Meeting #142-e *S5-222245***

**e-meeting, 4 - 12 April 2022**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **28.541** | **CR** | **draftCR** | **rev** | **3** | **Current version:** | **17.5.0** |  |
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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:***  | Rel-17 CR TS 28.541 Add feasibility check NRM fragment |
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| ***Source to WG:*** | Huawei,China Unicom, Deutsche Telekom,China Mobile,Samsung,Nokia,TELUS,KDDI |
| ***Source to TSG:*** | S5  |
|  |  |
| ***Work item code:*** | eNETSLICE\_PRO |  | ***Date:*** | 2021-07-28 |
|  |  |  |  |  |
| ***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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | The solution for network slice subnet feasibility check use case is described in clause 5.1.21 in TS 28.531 is missing. |
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| ***Summary of change:*** | Add network slice subnet feasibility check NRM fragment. |
|  |  |
| ***Consequences if not approved:*** | The solution for network slice subnet feasibility check use case is missing. |
|  |  |
| ***Clauses affected:*** | 6.2.1, 6.2.2, 6.3.X(new), 6.4.1, J.4.3 |
|  |  |
|  | **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:*** | ForgeLink: https://forge.3gpp.org/rep/sa5/MnS/-/tree/TS28.541\_Rel17\_S5-222245\_Add\_feasibility\_check\_NRM\_fragment |
|  |  |
| ***This CR's revision history:*** | 1. S5-215087 is the revision of S5-214200, which mainly address the following two comments raised in SA5#138emeeting:
* The feasibilityCheckJob can be more generic not specifc for network slice subnet only.
* The requirement for feasibility check for a target time in unclear.
1. S5-216205 is the resubmission of S5-215087
2. S5-221150 is the revision of S5-216205.
3. S5-22245 is the revision of S5-221150
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| **1st Change** |

## 6.2 Class diagram

### 6.2.1 Relationships



Figure 6.2.1-1: Network slice NRM fragment relationship

NOTE 1: The <<OpenModelClass>> NetworkService and <<OpenModelClass>> VNF are defined in [40].

NOTE 2: The target Network Service (NS) instance represents a group of VNFs and PNFs that are supporting the source network slice subnet instance.

NOTE 3: The instance tree of this NRM fragment would not contain the instances of NetworkService and VNF. However, the NetworkSliceSubNet instances would have an attribute holding the identifiers of NetworkService instances and the ManagedFunction instance would have an attribute holding identifiers of VNF instances.



Figure 6.2.1-2: Transport EP NRM fragment relationship



Figure 6.2.1-3: containment relationship for network slice fragment



Figure 6.2.1-4: containment relationship for feasibility check and resource reservation NRM fragment

### 6.2.2 Inheritance



Figure 6.2.2-1: Network slice inheritance relationship



Figure 6.2.2-2: inheritance relationship for feasibility check NRM fragment

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| **2nd Change** |

### 6.3.X FeasibilityCheckAndReservationJob

#### 6.3.X.1 Definition

This IOC represents a feasibility check and reservation job for network slicing related requirements (i.e. ServiceProfile for network slice related requirements, SliceProfile for network slice subnet related requirements) to determine whether the network slicing related requirements can be satisfied. It can be name-contained by SubNetwork.

When the MnS Consumer derives the network slicing related requirements (i.e. ServiceProfile, SliceProfile), before request the MnS producer to allocate or modify an NSI or NSSI, MnS consumer may express a feasibility check and reservation job requirement for the specified network slicing related requirements to MnS producer.

To express a feasibility check and reservation job requirement for specific network slicing related requirements (i.e. ServiceProfile, SliceProfile), MnS consumer needs to request MnS producer to create a FeasibilityCheckAndReservationJob instance on the MnS producer side with the network slicing related requirements specified, and to execute the feasibility check and resource reservation process.

 For deletion of feasibility check and reservation job, the MnS consumer needs to request the MnS producer to delete the FeasibilityCheckAndReservationJob instance on the MnS producer side.

Attribute "resourceReservation" is used to represent MnS consumer's requirements for resource reservation for corresponding network slicing related requirements (i.e. ServiceProfile, SliceProfile). In case the value is "True", which means MnS producer needs to reserve corresponding resources when the feasibility check result is feasible. In this case, attribute "requestedReservationExpiration" is used to represent MnS's requirements for the validity period of the resource reservation, which is specified by MnS consumer. While "reservationExpiration" is used to represent the actual validity period of the resource reservation, which is specified by MnS producer based on requested reservation expiration from MnS consumer and its own reservation capabilities. After the period expires, no guarantees are given for the resources associated to the corresponding network slicing related requirements (i.e. ServiceProfile, SliceProfile). In case the value by is "False" which means MnS producer only check the feasibility for corresponding network slicing related requirements, no guarantee for the corresponding resources.

To obtain the progress information of a feasibility check job, MnS consumer needs to request MnS producer to query the values of attribute "processMonitor".

To obtain the feasibility check result of a feasibility check job, MnS consumer needs to request MnS producer to query the values of attribute “feasibilityResult” and “inFeasibleReason” when the feasibility check job is finished. If the feasibility check result indicated as feasible, MnS consumer can request MnS producer to allocate a network slice or network slice subnet with the checked network slicing related requirements (i.e. ServiceProfile or SliceProfile). In case the feasibility check result is unfeasible, MnS consumer may update the network slicing related requirements, and may trigger the feasibility check job again.

To obtain the resource reservation status, MnS consumer need to request MnS producer to query the value of the attribute "resourceReservationStatus ".

MnS producer will use the reserved resources to satisfy the corresponding network slicing related requirements (i.e. SeviceProfile, SliceProfile) in the allocation request. In case to use the reserved resource, the network slice related requirements in the allocation request should same as network slice related requirements in the FeasibilityCheckJob IOC.

#### 6.3.X.2 Attributes

The FeasibilityCheckAndReservationJob IOC includes attributes inherited from Top IOC (defined in TS 28.622[30]) and the following attributes:

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| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable | isWritable | isInvariant | isNotifyable |
| sliceProfile | CM | T | T | F | T |
| serviceProfile | CM | T | T | F | T |
| resourceReservation | O | T | T | F | T |
| requestedReservationExpiration | O | T | T | F | T |
| processMonitor | M | T | F | F | T |
| feasibilityResult | M | T | F | F | T |
| inFeasibleReason | O | T | F | F | T |
| resourceReservationStatus | O | T | F | F | T |
| reservationFailureReason | O | T | F | F | T |
| reservationExpiration | O | T | F | F | T |
| recommendedRequirements | O | T | F | F | T |

Editor's Note: how to model the EP\_Transport information in the FeasibilityCheckAndReservationJob IOC is FFS, which can be used to support/enable TN part feasibility check.

#### 6.3.X.3 Attribute constraints

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| --- | --- |
| Name | Definition |
| sliceProfile Support Qualifier | Condition: The feasibilitycheckjob is used to check the feasibility for network slice subnet related requirements. |
| serviceProfile Support Qualifier | Condition: The feasibilitycheckjob is used to check the feasibility for network slice related requirements. |
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#### 6.3.X.4 Notifications

The common notifications defined in subclause 6.5 are valid for this IOC, without exceptions or additions.

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| **3rd Change** |

## 6.4 Attribute definition

### 6.4.1 Attribute properties

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| availability | This parameter specifies the communication service availability requirement, expressed as a percentage. The communication service availability is defined in clause 3.1 of TS 22.261 [28]. | type: Realmultiplicity: 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. | 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. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| operationalState | It indicates the operational state of the network slice or the network slice subnet. 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 or the network slice subnet. It describes the permission to use or prohibition against using the managed object 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]. | type: NsInfomultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: No default valueisNullable: True |
| nSInstanceId | This attribute specifies the identifier of NS instance corresponding to the network slice subnet instance.See clause 8.3.3.2.2 of ETSI GS NFV-IFA 013 [29]. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: No default valueisNullable: True |
| nsName | This attribute specifies the name of NS instance corresponding to the network slice subnet instance.See clause 8.3.3.2.2 of ETSI GS NFV-IFA 013 [29]. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: No default valueisNullable: True |
| description | This attribute specifies the description of NS instance corresponding to the network slice subnet instance.See clause 8.3.3.2.2 of ETSI GS NFV-IFA 013 [29]. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: No default valueisNullable: True |
| category | This attribute specifies the category of a service requirement/attribute of GST (see GSMA NG.116 [50]).allowedValues: character, scalability | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/A isNullable: False |
| tagging | This attribute specifies the tagging of a service requirement/attribute of GST in character category (see GSMA NG.116 [50]).allowedValues: performance, function, operation | type: ENUMmultiplicity: 1…3isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/A isNullable: False |
| exposure | This attribute specifies exposure mode of a service requirement/attribute of GST (see GSMA NG.116 [50]).allowedValues: API, KPI | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/A isNullable: False |
| sNSSAIList | This parameter specifies the S-NSSAI list to be supported by the network slice new to be created or the existing network slice 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 or network slice subnet instance. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| coverageAreaTAList | An attribute specifies a list of Tracking Areas for the network slice .allowedValues:Legacy TAC and Extended TAC are defined in clause 9.3.3.10 of TS 38.413 [5]. | type: Integermultiplicity: 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. See clause 6.3.1 of 28.554 [27]. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| topSliceSubnetProfile.latency | An attribute specifies the packet transmission latency (millisecond) through all domains of the network slice and is used to evaluate utilization performance of the end-to-end network slice. See clause 6.3.1 of 28.554 [27]. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| CNSliceSubnetProfile.latency | An attribute specifies the packet transmission latency (millisecond) through CN domain of the network slice and is used to evaluate the delay in CN domain, e.g. time between received UL/DL packet on N3/N6 interface of UPF and successfully sent out the packet on N6/N3 interface.  | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| RANSliceSubnetProfile.latency | An attribute specifies the packet transmission latency (millisecond) through RAN domain of the network slice and is used to evaluate the delay in RAN domain, e.g. time between received UL/DL packet on air interface/NgU of gNB and successfully sent out the packet on NgU/air interface of the gNB.  | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| uEMobilityLevel | An attribute specifies the mobility level of UE accessing the network slice. 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 |
| serviceProfilenetworkSlice.SharingIndicator | The attribute specifies whether a service, defined by the ServiceProfile, can share a NetworkSlice instance with other services or not. If “non-shared” the service needs a dedicated NetworkSlice instance. If “shared” the service may share a NetworkSlice instance with other service(s).allowedValues: shared, non-shared. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| serviceProfile.pLMNInfoList | It defines which PLMN and S-NSSAI combinations that are assigned for the service to satisfy service requirements represented by the ServiceProfile in case of network slicing feature is supported.allowedValues: Not applicable. | type: PLMNInfomultiplicity: 1..\*isOrdered: N/AisUnique: TruedefaultValue: NoneisNullable: False |
| sliceProfile.pLMNInfoList | It defines which PLMN and S-NSSAI combinations that are served by the SliceProfile in case of network slicing feature is supported.allowedValues: Not applicable. | type: PLMNInfomultiplicity: 1..\*isOrdered: N/AisUnique: TruedefaultValue: NoneisNullable: False |
| sliceProfile.resourceSharingLevel | An attribute specifies whether the resources to be allocated to the network slice subnet may be shared with another network slice subnet(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  | type: ServiceProfilemultiplicity: \*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  | type: SliceProfilemultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| sST | This parameter specifies the slice/service type in a ServiceProfile to be supported by a network slice.See clause 5.15.2 of 3GPP TS 23.501 [2]. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| delayTolerance | An attribute specifies the properties of service delivery flexibility, especially for the vertical services that are not chasing a high system performance. See clause 4.3 of TS 22.104 [51]. | type: DelayTolerancemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| DelayTolerance.support | An attribute specifies whether or not the network slice supports service delivery flexibility, especially for the vertical services that are not chasing a high system performance.allowedValues:"NOT SUPPORTED", "SUPPORTED". | type: <<enumeration>>multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| deterministicComm | An attribute specifies the properties of the deterministic communication for periodic user traffic, see clause 4.3 of TS 22.104 [51]. | type: DeterministicCommmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| DeterministicComm.availability | An attribute specifies whether or not the network slice supports deterministic communication for period user traffic.allowedValues:"NOT SUPPORTED", "SUPPORTED". | type: <<enumeration>>multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| DeterministicComm.periodicityList | An attribute specifies a list of periodicities supported by the network slice for deterministic communication. | type: Realmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| dLThptPerSlice | This attribute defines achievable data rate of the network slice in downlink that is available ubiquitously across the coverage area of the slice, refer NG.116 [50]. | type: XLThptmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| dLThptPerSliceSubnet | This attribute defines achievable data rate of the network slice subnet in downlink that is available ubiquitously across the coverage area of the slice. | type: XDLThpt multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| dLThptPerUE | This attribute defines data rate supported by the network slice per UE, refer NG.116 [50].  | type: XLThptmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| guaThpt | This attribute describes the guaranteed data rate. | type: Realmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: True |
| maxThpt | This attribute describes the maximum data rate. | type: Realmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: True |
| uLThptPerSlice | This attribute defines achievable data rate of the network slice in uplink that is available ubiquitously across the coverage area of the slice, refer NG.116 [50].  | type: XLThptmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| uLThptPerUE | This attribute defines data rate supported by the network slice per UE, refer NG.116 [50].  | type: XLThptmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| uLThptPerSliceSubnet | This attribute defines achievable data rate of the network slice subnet in uplink that is available ubiquitously across the coverage area of the slice. | type: XLThptmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| maxPktSize | This parameter specifies the maximum packet size supported by the network slice or the network slice subnet, refer NG.116 [50].  | type: MaxPktSizemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| MaxPktSize.maxsize | This parameter specifies the maximum packet size supported by the network slice, refer NG.116 [50].  | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| maxNumberofPDUSessions | This parameter defines the maximum number of concurrent PDU sessions supported by the network slice, refer NG.116 [50].  | type: MaxNumberofPDUSessionsmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| MaxNumberofPDUSessions.nOofPDUSessions | This parameter defines the maximum number of concurrent PDU sessions supported by the network slice, refer NG.116 [50].  | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| kPIMonitoring | An attribute specifies the name list of KQIs and KPIs available for performance monitoring. | type: KPIMonitoringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: True |
| KPIMonitoring. kPIList | An attribute specifies the name list of KQIs and KPIs available for performance monitoring. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: True |
| nBIoT | An attribute specifies whether NB-IoT is supported in the RAN in the network slice, see NG.116 [50]. | type: NBIoTmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| NBIoT.support | An attribute specifies whether NB-IoT is supported in the RAN in the network slice, see NG.116 [50].allowedValues:"NOT SUPPORTED", "SUPPORTED". | type: <<enumeration>>multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| synchronicity | An attribute specifies whether synchronicity of communication devices is supported, Two cases are most important in this context, see clause 3.4.29 of NG.116 [50]:- Synchronicity between a base station and a mobile device and- Synchronicity between mobile devices. | type: Synchronicitymultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| Synchronicity.availability | An attribute specifies whether synchronicity of communication devices is supported, see NG.116 [50].allowedValues:"NOT SUPPORTED", "BETWEEN BS AND UE", "BETWEEN BS AND UE & UE AND UE". | type: <<enumeration>>multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| Synchronicity.accuracy | An attribute specifies the accuracy of the synchronicity, see NG.116 [50]. | type: Realmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| RANSliceSubnetProfile.synchronicity | An attribute specifies whether synchronicity of communication devices is supported in the RAN domain, Two cases are most important in this context, see clause 3.4.29 of NG.116 [50]:- Synchronicity between a base station and a mobile device and- Synchronicity between mobile devices. | type: SynchronicityRANSubnetmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| SynchronicityRANSubnet.availability | An attribute specifies whether synchronicity of communication devices is supported in the RAN domain, see NG.116 [50].allowedValues:"NOT SUPPORTED", "BETWEEN BS AND UE", "BETWEEN BS AND UE & UE AND UE". | type: <<enumeration>>multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| SynchronicityRANSubnet.accuracy | An attribute specifies the accuracy of the synchronicity in the RAN domain, see NG.116 [50]. | type: Realmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| userMgmtOpen | An attribute specifies whether or not the network slice supports the capability for the NSC to manage their users or groups of users’ network services and corresponding requirements. | type: UserMgmtOpenmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| UserMgmtOpen.support | An attribute specifies whether or not the network slice supports the capability for the NSC to manage their users or groups of users’ network services and corresponding requirements.allowedValues:"NOT SUPPORTED", "SUPPORTED". | type: <<enumeration>>multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| v2XCommModels | An attribute specifies whether or not the V2X communication mode is supported by the network slice. | type: V2XCommModemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| V2XCommMode.v2XMode | An attribute specifies whether or not the V2X communication mode is supported by the network slice.allowedValues:"NOT SUPPORTED", "SUPPORTED BY NR". | type: <<enumeration>>multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| coverageArea | An attribute specifies the coverage area of the network slice, i.e. the geographic region where a 3GPP communication service is accessible, see Table 7.1-1 of TS 22.261 [28]) and NG.116 [50]. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: True |
| termDensity | An attribute specifies the overall user density over the coverage area of the network slice. See Table 7.1-1 of TS 22.261 [28]). | type: TermDensitymultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: True |
| TermDensity.density | An attribute specifies the overall user density over the coverage area of the network slice. See Table 7.1-1 of TS 22.261 [28]). | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: True |
| positioning | An attribute specifies whether the network slice provides geo-localization methods or supporting methods, see clause 3.4.20 of NG.116 [50]. | type: Positioningmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| Positioning.availability | An attribute specifies if this attribute is provided by the network slice and contains a list of positioning methods provided by the slice. If the list is empty this attribute is not available in the network slice and the other parameters might be ignored, see NG.116 [50]. Comma separated multiple values are allowed:CIDE-CID (LTE and NR), OTDOA (LTE and NR), RF fingerprinting, AECID, Hybrid positioning, NET-RTK. | type: ENUMmultiplicity: 1..6isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| Positioning.predictionfrequency | An attribute specifies how often location information is provided. This parameter simply defines how often the customer is allowed to request location information. This is not related to the time it takes to determine the location, which is a characteristic of the positioning method, see NG.116 [50].allowedValues:"PERSEC", "PERMIN", "PERHOUR". | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| Positioning.accuracy | An attribute specifies the accuracy of the location information. Accuracy depends on the respective positioning solution applied in the network slice, see NG.116 [50]. | type: Realmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| RANSliceSubnetProfile.positioning | An attribute specifies whether the RAN domain of the network slice provides geo-localization methods or supporting methods, see clause 3.4.20 of NG.116 [50]. | type: PositioningRANSubnetmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| PositioningRANSubnet.availability | An attribute specifies if this attribute is provided by the RAN domain of the network slice and contains a list of positioning methods provided by the RAN domain. If the list is empty this attribute is not available in the RAN domain and the other parameters might be ignored, see NG.116 [50]. Comma separated multiple values are allowed:CIDE-CID (LTE and NR), OTDOA (LTE and NR), RF fingerprinting, AECID, Hybrid positioning, NET-RTK. | type: ENUMmultiplicity: 1..6isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| PositioningRANSubnet.predictionfrequency | An attribute specifies how often location information is provided. This parameter simply defines how often the customer is allowed to request location information. This is not related to the time it takes to determine the location, which is a characteristic of the positioning method, see NG.116 [50].allowedValues:"PERSEC", "PERMIN", "PERHOUR". | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| PositioningRANSubnet.accuracy | An attribute specifies the accuracy of the location information. Accuracy depends on the respective positioning solution applied in the RAN domain of the network slice, measurement unit is meter, see NG.116 [50]. | type: Realmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| activityFactor | An attribute specifies the percentage value of the amount of simultaneous active UEs to the total number of UEs where active means the UEs are exchanging data with the network. See Table 7.1-1 of TS 22.261 [28]). | type: Realmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: True |
| uESpeed | An attribute specifies the maximum speed (in km/hour) supported by the network slice or network slice subnet at which a defined QoS can be achieved. See Table 7.1-1 of TS 22.261 [28]). | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: True |
| jitter | An attribute specifies the deviation from the desired value to the actual value when assessing time parameters, see clause C.4.1 of TS 22.104 [51]. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: True |
| survivalTime | An attribute specifies the time that an application consuming a communication service may continue without an anticipated message. See clause 5 of TS 22.104 [51]). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: True |
| reliability | An attribute specifies in the context of network layer packet transmissions, percentage value of the amount of sent network layer packets successfully delivered to a given system entity within the time constraint required by the targeted service, divided by the total number of sent network layer packets, see TS 22.261 [28] and TS 22.104 [51]. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: True |
| 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 |
| ipAddress | This parameter specifies the IP address assigned to a logical transport interface/endpoint. It can be an IPv4 address (See RFC 791 [37]) or an IPv6 address (See RFC 2373 [38]).See note 1 | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| logicInterfaceId | This parameter specifies the identify of a logical transport interface. It could be VLAN ID (See IEEE 802.1Q [39]), MPLS Tag or Segment ID. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| nextHopInfoList | This parameter is used to identify ingress transport node. Each node can be identified by any of combination of IP address of next-hop router of transport network, system name, port name, IP management address of transport nodes. | type: Stringmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| qosProfileRefList | This parameter specifies reference to QoS Profile for a logical transport interface. A QoS profile includes a set of parameters which are locally provisioned on both sides of a logical transport interface. | type: Stringmultiplicity: \*isOrdered: N/AisUnique: TruedefaultValue: NoneisNullable: True |
| maxDLDataVolume | An attribute specifies the maximum DL PDCP data volume supported by the network slice instance (performance measurement definition see in TS 28.552[69]). The unit is MByte/day. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| maxULDataVolume | An attribute specifies the maximum UL PDCP data volume supported by the network slice instance (performance measurement definition see in TS 28.552[69]). The unit is MByte/day. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| serviceType | An attribute specifies the standardized network slice type.allowedValues: eMBB, URLLC, MIoT, V2X. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: True |
| epApplicationRef | This parameter specifies a list of application level EPs (i.e. EP\_N3 or EP\_NgU) associated with the logical transport interface. | type: DNmultiplicity: \*isOrdered: N/AisUnique: TruedefaultValue: NoneisNullable: False |
| epTransportRef | This parameter specifies a list of transport level EPs associated with the application level EP (i.e. EP\_N3 or EP\_NgU) or network slice subnet. | type: DNmultiplicity: \*isOrdered: N/AisUnique: TruedefaultValue: NoneisNullable: True |
| sliceSimultaneousUse | This attribute describes whether a network slice can be simultaneously used by a device together with other network slices and if so, with which other classes of network slices.allowedValues: “0”, “1”, “2”, “3”, “4”.“0”: Can be used with any network slice“1”: Can be used with network slices with same SST value“2”: Can be used with any network slice with same SD value“3”: Cannot be used with another network slice“4”: Cannot be used by a UE in a specific location | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| energyEfficiency | An attribute which describes the energy efficiency, i.e. the ratio between the performance and the energy consumption (EC) when assessed during the same time frame, see clause 3.4.7 of NG.116 [50]. | type: EnergyEfficiencymultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| EnergyEfficiency.performance | Depending on the sST value, EnergyEfficiency.performance will be- eMBBEEPerfReqor- uRLLCEEPerfReqor- mIoTEEPerfReqallowedValues:- eMBBEEPerfReq identifies the requirement in terms of energy efficiency, i.e. the performance per consumed Joule, where performance can take the following forms: - number of bits (Integer) (see TS 28.554 [27] clause 6.7.2.2).- uRLLCEEPerfReq identifies the requirement in terms of energy efficiency, i.e. the performance per consumed Joule, where performance can take the following forms: - latency in 0.1ms (Integer) (see TS 28.554 [27] clause 6.7.2.3).- mIoTEEPerfReq identifies the requirement in terms of energy efficiency, i.e. the performance per consumed Joule, where performance can take the following forms: - maximum number of registered subscribers (Integer) (see TS 28.554 [27] clause 6.7.2.4.1), - mean number of active UEs (Integer) (see TS 28.554 [27] clause 6.7.2.4.2).See NOTE 3. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| topSliceSubnetProfile.energyEfficiency | An attribute which describes the energy efficiency through all domains of the network slice, i.e. the ratio between the performance and the energy consumption (EC) when assessed during the same time frame, see clause 3.4.7 of NG.116 [50]. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| CNSliceSubnetProfile. energyEfficiency | An attribute which describes the energy efficiency through CN domain of the network slice, i.e. the ratio between the performance and the energy consumption (EC) when assessed during the same time frame, see clause 3.4.7 of NG.116 [50]. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| RANSliceSubnetProfile. energyEfficiency | An attribute which describes the energy efficiency through RAN domain of the network slice, i.e. the ratio between the performance and the energy consumption (EC) when assessed during the same time frame, see clause 3.4.7 of NG.116 [50]. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| processMonitor | An attribute describes the process monitoring information of the feasibility check job. See correddponding processMonitor definition in TS 28.622[30]. | type: ProcessMonitormultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| feasibilityResult | An attribute which specifies the feasibility check result for the feasibility check job. This attribute is configured by MnS producer and can be read by MnS consumer. The feasibilityResult is configured once the "status" is "FINISHED"Allowed Value: FEASIBLE: which means the specified network slicing related requirements (i.e. ServiceProfile, SliceProfile) can be satisfied by the MnS producer.InFEASIBLE: which means the specified network slicing related requirements (i.e. ServiceProfile, SliceProfile) cannot be satisfied by the MnS producer. | type: Enummultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| inFeasibleReason | An attribute that specifies the additional reason information if the feasibility check result is infeasible. This attribute can be absent if the feasibility check result is feasibile. Allowed Value: the detailed content (Enum Value) for the inFeasibleReason is not defined in the present document. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: True |
| resourceReservation | An attribute represents MnS consumer's requirements for resource reservation.Allowed Value: TRUE: MnS producer need to reserve corresponding resources  FALSE (DeaultValue): no guarantee for the corresponding resources. | type: Booleanmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: False |
| requestReservationExpiration | An attribute which specifes MnS consumer's requirememts for the validity period of the resource reservation. The value of reservationExpiration is specified by MnS consumer. | type: Timestampmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: False |
| reservationExpiration | An attribute which specifes the actual validity period of the resource reservation. After the period expires, no guarantees are given for the resources associated to the corresponding network slicing related requirements (i.e. ServiceProfile, SliceProfile). which is specified by MnS producer based on requested reservation expiration from MnS consumer and its own reservation capabilities. In case MnS produer have the enpugh capability to satisfy MnS consumer's reservation requirememts, the value of reservationExpiration is same as requestReservationExpiration. | type: Timestampmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: False |
| resourceReservationStatus | An attribute which specifies the resource reservation result for the feasibility check job. This attribute is configured by MnS producer and can be read by MnS consumer.Allowed Value: RESERVED: which means the resources for the specified network slicing related requirements (i.e. ServiceProfile, SliceProfile) is reserved.UNRESERVED: which means the resources for the specified network slicing related requirements (i.e. ServiceProfile, SliceProfile) is not reserved.USED: which means the reserved resource for the specified network slicing related requirements is used. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: False |
| recommendedRequirements | An attribute which specifies the recommended network slicing related requirements (i.e. ServiceProfile and SliceProfile information) which can be supported by the MnS producer.This information is provided when the feasibility check result is infeasible. This information can be used to by MnS consumer to adjust the network slicing related requirements. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: False |
| reservationFailureReason | An attribute that specifies the additional reason information if the reservation is failed. This attribute can be absent if the reservation is successful. Allowed Value: the detailed content (Enum Value) for the reservationFailureReason is not defined in the present document. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: True |
| NOTE 1: There is no direct relationship between localAddress/remoteAddress in EP\_RP and ipAddress in EP\_transport. While the localAddress/remoteAddress in EP\_RP could be exchanged as part of signalling between GTP-u tunnel end points, ipAddress in EP\_transport is used for transport routing. NOTE 2: voidNOTE 3: energy efficiency requirement for V2X is not part of the current document. |

|  |
| --- |
| **4th Change** |

## J.4.3 OpenAPI document "sliceNrm.yaml"

openapi: 3.0.1

info:

 title: Slice NRM

 version: 17.6.0

 description: >-

 OAS 3.0.1 specification of the Slice NRM

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externalDocs:

 description: 3GPP TS 28.541; 5G NRM, Slice NRM

 url: http://www.3gpp.org/ftp/Specs/archive/28\_series/28.541/

paths: {}

components:

 schemas:

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

 Float:

 type: number

 format: float

 MobilityLevel:

 type: string

 enum:

 - STATIONARY

 - NOMADIC

 - RESTRICTED MOBILITY

 - FULLY MOBILITY

 SynAvailability:

 type: string

 enum:

 - NOT SUPPORTED

 - BETWEEN BS AND UE

 - BETWEEN BS AND UE & UE AND UE

 PositioningAvailability:

 type: array

 items:

 type: string

 enum:

 - CIDE-CID

 - OTDOA

 - RF FINGERPRINTING

 - AECID

 - HYBRID POSITIONING

 - NET-RTK

 Predictionfrequency:

 type: string

 enum:

 - PERSEC

 - PERMIN

 - PERHOUR

 SharingLevel:

 type: string

 enum:

 - SHARED

 - NON-SHARED

 NetworkSliceSharingIndicator:

 type: string

 enum:

 - SHARED

 - NON-SHARED

 ServiceType:

 type: string

 enum:

 - eMBB

 - RLLC

 - MIoT

 - V2X

 SliceSimultaneousUse:

 type: string

 enum:

 - ZERO

 - ONE

 - TWO

 - THREE

 - FOUR

 Category:

 type: string

 enum:

 - CHARACTER

 - SCALABILITY

 Tagging:

 type: array

 items:

 type: string

 enum:

 - PERFORMANCE

 - FUNCTION

 - OPERATION

 Exposure:

 type: string

 enum:

 - API

 - KPI

 ServAttrCom:

 type: object

 properties:

 category:

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

 tagging:

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

 exposure:

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

 Support:

 type: string

 enum:

 - NOT SUPPORTED

 - SUPPORTED

 DelayTolerance:

 type: object

 properties:

 servAttrCom:

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

 support:

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

 DeterministicComm:

 type: object

 properties:

 servAttrCom:

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

 availability:

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

 periodicityList:

 type: string

 XLThpt:

 type: object

 properties:

 servAttrCom:

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

 guaThpt:

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

 maxThpt:

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

 MaxPktSize:

 type: object

 properties:

 servAttrCom:

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

 maxsize:

 type: integer

 MaxNumberofPDUSessions:

 type: object

 properties:

 servAttrCom:

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

 nOofPDUSessions:

 type: integer

 KPIMonitoring:

 type: object

 properties:

 servAttrCom:

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

 kPIList:

 type: string

 NBIoT:

 type: object

 properties:

 servAttrCom:

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

 support:

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

 RadioSpectrum:

 type: object

 properties:

 servAttrCom:

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

 nROperatingBands:

 type: string

 Synchronicity:

 type: object

 properties:

 servAttrCom:

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

 availability:

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

 accuracy:

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

 SynchronicityRANSubnet:

 type: object

 properties:

 availability:

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

 accuracy:

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

 Positioning:

 type: object

 properties:

 servAttrCom:

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

 availability:

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

 predictionfrequency:

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

 accuracy:

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

 PositioningRANSubnet:

 type: object

 properties:

 availability:

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

 predictionfrequency:

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

 accuracy:

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

 UserMgmtOpen:

 type: object

 properties:

 servAttrCom:

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

 support:

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

 V2XCommModels:

 type: object

 properties:

 servAttrCom:

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

 v2XMode:

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

 TermDensity:

 type: object

 properties:

 servAttrCom:

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

 density:

 type: integer

 NsInfo:

 type: object

 properties:

 nsInstanceId:

 type: string

 nsName:

 type: string

 EmbbEEPerfReq:

 type: object

 properties:

 kpiType:

 type: string

 enum:

 - NUMOFBITS

 - NUMOFBITS\_RANBASED

 req:

 type: number

 UrllcEEPerfReq:

 type: object

 properties:

 kpiType:

 type: string

 enum:

 - INVOFLATENCY

 - NUMOFBITS\_MULTIPLIED\_INVOFLATENCY

 req:

 type: number

 MIoTEEPerfReq:

 type: object

 properties:

 kpiType:

 type: string

 enum:

 - MAXREGSUBS

 - MEANACTIVEUES

 req:

 type: number

 EEPerfReq:

 oneOf:

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

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

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

 EnergyEfficiency:

 type: object

 properties:

 servAttrCom:

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

 performance:

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

 NSSAASupport:

 type: object

 properties:

 servAttrCom:

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

 support:

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

 SecFunc:

 type: object

 properties:

 secFunId:

 type: string

 secFunType:

 type: string

 secRules:

 type: array

 items:

 type: string

 N6Protection:

 type: object

 properties:

 servAttrCom:

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

 secFuncList:

 type: array

 items:

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

 CNSliceSubnetProfile:

 type: object

 properties:

 maxNumberofUEs:

 type: integer

 dLLatency:

 type: integer

 uLLatency:

 type: integer

 dLThptPerSliceSubnet:

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

 dLThptPerUE:

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

 uLThptPerSliceSubnet:

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

 uLThptPerUE:

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

 maxNumberOfPDUSessions:

 type: integer

 coverageAreaTAList:

 type: integer

 resourceSharingLevel:

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

 dLMaxPktSize:

 type: integer

 uLMaxPktSize:

 type: integer

 delayTolerance:

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

 synchronicity:

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

 sliceSimultaneousUse:

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

 reliability:

 type: string

 energyEfficiency:

 type: number

 dLDeterministicComm:

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

 uLDeterministicComm:

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

 survivalTime:

 type: string

 nssaaSupport:

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

 n6Protection:

 $ref: '#/components/schemas/N6Protection'

 RANSliceSubnetProfile:

 type: object

 properties:

 coverageAreaTAList:

 type: integer

 dLLatency:

 type: integer

 uLLatency:

 type: integer

 uEMobilityLevel:

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

 resourceSharingLevel:

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

 maxNumberofUEs:

 type: integer

 activityFactor:

 type: integer

 dLThptPerSliceSubnet:

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

 dLThptPerUE:

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

 uLThptPerSliceSubnet:

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

 uLThptPerUE:

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

 uESpeed:

 type: integer

 reliability:

 type: string

 serviceType:

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

 dLMaxPktSize:

 type: integer

 uLMaxPktSize:

 type: integer

 nROperatingBands:

 type: string

 delayTolerance:

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

 positioning:

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

 sliceSimultaneousUse:

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

 energyEfficiency:

 type: number

 termDensity:

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

 survivalTime:

 type: string

 synchronicity:

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

 dLDeterministicComm:

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

 uLDeterministicComm:

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

 TopSliceSubnetProfile:

 type: object

 properties:

 dLLatency:

 type: integer

 uLLatency:

 type: integer

 maxNumberofUEs:

 type: integer

 dLThptPerSliceSubnet:

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

 dLThptPerUE:

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

 uLThptPerSliceSubnet:

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

 uLThptPerUE:

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

 dLMaxPktSize:

 type: integer

 uLMaxPktSize:

 type: integer

 maxNumberOfPDUSessions:

 type: integer

 nROperatingBands:

 type: string

 sliceSimultaneousUse:

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

 energyEfficiency:

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

 synchronicity:

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

 delayTolerance:

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

 positioning:

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

 termDensity:

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

 activityFactor:

 type: integer

 coverageAreaTAList:

 type: integer

 resourceSharingLevel:

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

 uEMobilityLevel:

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

 uESpeed:

 type: integer

 reliability:

 type: string

 serviceType:

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

 dLDeterministicComm:

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

 uLDeterministicComm:

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

 survivalTime:

 type: string

 ServiceProfile:

 type: object

 properties:

 serviceProfileId:

 type: string

 plmnInfoList:

 $ref: 'nrNrm.yaml#/components/schemas/PlmnInfoList'

 maxNumberofUEs:

 type: number

 dLLatency:

 type: number

 uLLatency:

 type: number

 uEMobilityLevel:

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

 sst:

 $ref: 'nrNrm.yaml#/components/schemas/Sst'

 networkSliceSharingIndicator:

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

 availability:

 type: number

 delayTolerance:

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

 dLDeterministicComm:

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

 uLDeterministicComm:

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

 dLThptPerSlice:

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

 dLThptPerUE:

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

 uLThptPerSlice:

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

 uLThptPerUE:

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

 dLMaxPktSize:

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

 uLMaxPktSize:

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

 maxNumberofPDUSessions:

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

 kPIMonitoring:

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

 nBIoT:

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

 radioSpectrum:

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

 synchronicity:

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

 positioning:

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

 userMgmtOpen:

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

 v2XModels:

 $ref: '#/components/schemas/V2XCommModels'

 coverageArea:

 type: string

 termDensity:

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

 activityFactor:

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

 uESpeed:

 type: integer

 jitter:

 type: integer

 survivalTime:

 type: string

 reliability:

 type: string

 maxDLDataVolume:

 type: string

 maxULDataVolume:

 type: string

 sliceSimultaneousUse:

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

 energyEfficiency:

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

 nssaaSupport:

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

 n6Protection:

 $ref: '#/components/schemas/N6Protection'

 SliceProfile:

 type: object

 properties:

 serviceProfileId:

 type: string

 plmnInfoList:

 $ref: 'nrNrm.yaml#/components/schemas/PlmnInfoList'

 cNSliceSubnetProfile:

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

 rANSliceSubnetProfile:

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

 topSliceSubnetProfile:

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

 IpAddress:

 oneOf:

 - $ref: 'comDefs.yaml#/components/schemas/Ipv4Addr'

 - $ref: 'comDefs.yaml#/components/schemas/Ipv6Addr'

 LogicInterfaceInfo:

 type: object

 properties:

 logicalInterfceType:

 type: string

 enum:

 - VLAN

 - MPLS

 - Segment

 logicalInterfceId:

 type: string

 ServiceProfileList:

 type: array

 items:

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

 SliceProfileList:

 type: array

 items:

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

 FeasibilityResult:

 description: ->

 An attribute which specifies the feasibility check result for the feasibility check job.

 type: string

 enum:

 - FEASIBLE

 - INFEASIBLE

 InFeasibleReason:

 description: ->

 An attribute that specifies the additional reason information if the feasibility check result is infeasible.The detailed ENUM value is FFS.

 type: string

 RecommendedRequirements:

 description: ->

 An attribute that specifies the recommended network slicing related requirements (i.e. ServiceProfile and SliceProfile information) which can be supported by the MnS producer..

 type: string

 ResourceReservation:

 description: ->

 An attribute represents MnS consumer's requirements for resource reservation.

 type: boolean

 RequestedReservationExpiration:

 description: ->

 An attribute which specifes MnS consuner's requirements for the validity period of the resource reservation.

 type: string

 ResourceReservationStatus:

 description: ->

 An attribute which specifies the resource reservation result for the feasibility check job.

 type: string

 enum:

 - RESERVED

 - UNRESERVED

 - USED

 ReservationExpiration:

 description: ->

 An attribute which specifes the actual validity period of the resource reservation..

 type: string

 ReservationFailureReason:

 description: ->

 An attribute that specifies the additional reason information if the reservation is failed.

 type: string

#------------ 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:

 SubNetwork:

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

 NetworkSlice:

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

 NetworkSliceSubnet:

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

 EP\_Transport:

 $ref: '#/components/schemas/EP\_Transport-Multiple'

 FeasibilityCheckJob:

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

 NetworkSlice-Single:

 allOf:

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

 - type: object

 properties:

 attributes:

 allOf:

 - type: object

 properties:

 networkSliceSubnetRef:

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

 operationalState:

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

 administrativeState:

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

 serviceProfileList:

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

 NetworkSliceSubnet-Single:

 allOf:

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

 - type: object

 properties:

 attributes:

 allOf:

 - type: object

 properties:

 managedFunctionRefList:

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

 networkSliceSubnetRefList:

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

 operationalState:

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

 administrativeState:

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

 nsInfo:

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

 sliceProfileList:

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

 epTransportRefList:

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

 priorityLabel:

 type: integer

 networkSliceSubnetType:

 type: string

 enum:

 - TOP\_SLICESUBNET

 - RAN\_SLICESUBNET

 - CN\_SLICESUBNET

 EP\_Transport-Single:

 allOf:

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

 - type: object

 properties:

 attributes:

 type: object

 properties:

 ipAddress:

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

 logicInterfaceInfo:

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

 nextHopInfo:

 type: string

 qosProfile:

 type: string

 epApplicationRefs:

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

 FeasibilityCheckJob-Single:

 allOf:

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

 - type: object

 properties:

 attributes:

 type: object

 properties:

 profile:

 oneOf:

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

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

 resourceReservation:

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

 requestedReservationExpiration:

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

 processMonitor:

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

 feasibilityResult:

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

 inFeasibleReason:

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

 resourceReservationStatus:

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

 reservationFailureReason:

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

 reservationExpiration:

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

 recommendedRequirements:

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

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

 SubNetwork-Multiple:

 type: array

 items:

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

 NetworkSlice-Multiple:

 type: array

 items:

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

 NetworkSliceSubnet-Multiple:

 type: array

 items:

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

 EP\_Transport-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/EP\_Transport-Single'

 FeasibilityCheckJob-Multiple:

 type: array

 items:

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

#------------ Definitions in TS 28.541 for TS 28.532 -----------------------------

 resources-sliceNrm:

 oneOf:

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

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

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

 - $ref: '#/components/schemas/EP\_Transport-Single'

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

|  |
| --- |
| **End of Change** |