**3GPP TSG-SA5 Meeting #141-e *S5-221035rev2***

**Online, , 17th Jan 2022 - 26th Jan 2022**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **28.541** | **CR** | **0645** | **rev** | **-** | **Current version:** | **17.5.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Rel-17 CR 28.541 Update RANSliceSubnetProfile attributes | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | TELEFONICA S.A. | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | EMA5SLA | | | | |  | ***Date:*** | | | 2022-01-05 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | dLThptPerSliceSubnet and uLThptPerSliceSubnet attributes are included in TopSliceSubnetProfile and CNSliceSubnetProfile, but missed in RANSliceSubnetProfile.  According to clause 6.3.25, TopSliceSubnetProfile includes an aggregated list of the attributes from RANSliceSubnetProfile and CNSliceSubnetProfile. To comply with this definition, it is therefore needed to add dLThptPerSliceSubnet and uLThptPerSliceSubnet attributes to RANSliceSubnetProfile. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * Add dLThptPerSliceSubnet and uLThptPerSliceSubnet attributes to RANSliceSubnetProfile. * Mirror these changes in stage 3. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | May lead to incorrect implementation | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.3.24.2, J.4.3, N.2.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 CR's revision history:*** | |  | | | | | | | | |

|  |
| --- |
| **1st change** |

### 6.3.24 RANSliceSubnetProfile<<dataType>>

#### 6.3.24.1 Definition

This data type represents the requirements for RAN slice profile.

Editor's NOTE 1: Whether the attributes of RANSliceSubnetProfile need to be modelled by one IOC or more than one IOC is FFS.

Editor's NOTE 2: Whether RANSliceSubnetProfile is an IOC or dataType is FFS.

#### 6.3.24.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | S | isReadable | isWritable | isInvariant | isNotifyable |
|  |  |  |  |  |  |
| coverageAreaTAList | O | T | T | F | T |
| uEMobilityLevel | O | T | T | F | T |
| resourceSharingLevel | O | T | T | F | T |
| maxNumberofUEs | O | T | T | F | T |
| activityFactor | O | T | T | F | T |
| dLThptPerSliceSubnet | O | T | T | F | T |
| dLThptPerUE | O | T | T | F | T |
| uLThptPerSliceSubnet | O | T | T | F | T |
| uLThptPerUE | O | T | T | F | T |
| uESpeed | O | T | T | F | T |
| reliability | O | T | T | F | T |
| nROperatingBands | O | T | T | F | T |
| serviceType | O | T | T | F | T |
| dLLatency | O | T | T | F | T |
| uLLatency | O | T | T | F | T |
| delayTolerance | O | T | T | F | T |
| sliceSimultaneousUse | O | T | T | F | T |
| dLMaxPktSize | O | T | T | F | T |
| uLMaxPktSize | O | T | T | F | T |
| energyEfficiency | O | T | T | F | T |
| termDensity | O | T | T | F | T |
| survivalTime | O | T | T | F | T |
| dLDeterministicComm | O | T | T | F | T |
| uLDeterministicComm | O | T | T | F | T |
| positioning | O | T | T | F | T |
| synchronicity | O | T | T | F | T |

#### 6.3.24.3 Attribute constraints

None.

#### 6.3.24.4 Notifications

The subclause 6.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

|  |
| --- |
| **2nd change** |

Annex J (normative):  
OpenAPI definition of the Slice NRM

# J.1 General

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

The Information Service (IS) of the NR NRM is defined in clause 6.

Mapping rules to produce the OpenAPI definition based on the IS are defined in 3GPP TS 32.160 [47].

# J.2 Void

# J.3 Void

# J.4 Solution Set (SS) definitions

## J.4.1 Void

## J.4.2 Void

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

openapi: 3.0.1

info:

title: Slice NRM

version: 17.4.0

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: integer

UrllcEEPerfReq:

type: integer

MIoTEEPerfReq:

type: object

properties:

KpiType:

type: string

enum:

- MAXREGSUBS

- MEANACTIVEUES

Req:

type: integer

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: integer

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: integer

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:

type: integer

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: 'genericNrm.yaml#/components/schemas/Ipv4Addr'

- $ref: 'genericNrm.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'

#------------ 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'

NetworkSlice-Single:

allOf:

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

- type: object

properties:

attributes:

allOf:

- type: object

properties:

networkSliceSubnetRef:

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

operationalState:

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

administrativeState:

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

networkSliceSubnetRefList:

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

operationalState:

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

administrativeState:

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

nsInfo:

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

sliceProfileList:

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

epTransportRefList:

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

priorityLabel:

type: integer

networkSliceSubnetType:

type: string

enum:

- TopSliceSubnet

- RANSliceSubnet

- CNSliceSubnet

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: 'genericNrm.yaml#/components/schemas/DnList'

#-------- 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'

#------------ 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'

|  |
| --- |
| **3rd change** |

Annex N (normative):  
YANG definition of the Slice NRM

# N.1 General

This annex contains the YANG definitions for the Slice NRM in YANG format.

The Information Service (IS) of the Slice NRM is defined in clause 6.

Mapping rules to produce the YANG definition based on the IS are defined in TS 32.160 [14].

# N.2 Modules

## N.2.1 module \_3gpp-ns-nrm-networkslice.yang

<CODE BEGINS>

module \_3gpp-ns-nrm-networkslice {

yang-version 1.1;

namespace urn:3gpp:sa5:\_3gpp-ns-nrm-networkslice;

prefix ns3gpp;

import \_3gpp-ns-nrm-networkslicesubnet { prefix nss3gpp; }

import \_3gpp-common-subnetwork { prefix subnet3gpp; }

import \_3gpp-common-yang-types { prefix types3gpp; }

import \_3gpp-common-top { prefix top3gpp; }

include \_3gpp-ns-nrm-serviceprofile;

organization "3GPP SA5";

contact

"https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";

description "A network slice instance in a 5G network.";

reference "3GPP TS 28.541

Management and orchestration;

5G Network Resource Model (NRM);

Information model definitions for network slice NRM (chapter 6)

";

revision 2020-06-02 {

reference "CR-0485, CR-0508";

}

revision 2020-02-19 {

description "Introduction of YANG definitions for network slice NRM";

reference "CR-0458";

}

grouping NetworkSliceGrp {

uses subnet3gpp:SubNetworkGrp; // Inherits from SubNetwork

leaf operationalState {

description "The operational state of the network slice instance.

It describes whether or not the resource is physically installed

and working.";

config false;

type types3gpp:OperationalState;

}

leaf administrativeState {

description "The administrative state of the network slice instance.

It describes the permission to use or prohibition against

using the instance, imposed through the OAM services.";

type types3gpp:AdministrativeState;

}

list serviceProfileList {

description "A list of service profiles supported by the network

slice instance.";

key serviceProfileId;

uses ServiceProfileGrp;

}

leaf networkSliceSubnetRef {

type leafref {

path /nss3gpp:NetworkSliceSubnet/nss3gpp:id;

}

description "The NetworkSliceSubnet that the NetworkSlice is

associated with.";

}

}

list NetworkSlice {

description "Represents the properties of a network slice instance in

a 5G network.";

key id;

container attributes {

uses NetworkSliceGrp;

}

uses top3gpp:Top\_Grp;

}

}

<CODE ENDS>

## N.2.2 module \_3gpp-ns-nrm-networkslicesubnet.yang

<CODE BEGINS>

module \_3gpp-ns-nrm-networkslicesubnet {

yang-version 1.1;

namespace urn:3gpp:sa5:\_3gpp-ns-nrm-networkslicesubnet;

prefix nss3gpp;

import \_3gpp-common-yang-types { prefix types3gpp; }

import \_3gpp-common-subnetwork { prefix subnet3gpp; }

import \_3gpp-common-measurements { prefix meas3gpp; }

import \_3gpp-common-top { prefix top3gpp; }

// import \_3gpp-ns-nrm-common { prefix ns3cmn; }

include \_3gpp-ns-nrm-sliceprofile;

organization "3GPP SA5";

contact

"https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";

description "This IOC represents the properties of a network slice subnet

instance in a 5G network.";

reference "3GPP TS 28.541

Management and orchestration;

5G Network Resource Model (NRM);

Information model definitions for network slice NRM (chapter 6)

";

revision 2021-05-05 {

description "replace perfReq with 3 new datatypes xxxSliceSubnetProfile";

reference "CR-0485";

}

revision 2020-02-19 {

description "Introduction of YANG definitions for network slice NRM";

reference "CR-0458";

}

revision 2019-06-07 {

description "initial revision";

reference "Based on

3GPP TS 28.541 V15.X.XX";

}

feature MeasurementsUnderNetworkSliceSubnet {

description "The MeasurementSubtree shall be contained under

NetworkSliceSubnet.";

}

typedef ETSI-GS-NFV-Identifier {

type string;

reference "ETSI GS NFV-IFA 013";

}

grouping EPTransportGrp {

leaf ipAddress {

description "This parameter specifies the IP address assigned to a

logical transport interface/endpoint. It can be an IPv4 address

(See RFC 791) or an IPv6 address (See RFC 2373).";

mandatory true;

type string;

}

leaf logicInterfaceId {

description "This parameter specifies the identify of a logical

transport interface. It could be VLAN ID (See IEEE 802.1Q),

MPLS Tag or Segment ID.";

mandatory true;

type string;

}

leaf-list nextHopInfo {

description "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 string;

}

leaf-list qosProfile {

description "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 string;

}

leaf-list epApplicationRef {

description "This parameter specifies a list of application level

EPs associated with the logical transport interface.";

min-elements 1;

type types3gpp:DistinguishedName;

}

uses top3gpp:Top\_Grp;

}

grouping NsInfoGrp {

description "The NsInfo of the NS instance corresponding to the network

slice subnet instance.";

//suport condition: It shall be supported if the NSS instance is

//realized in the virtualized environment.

// Otherwise this attribute shall be absent.

reference "ETSI GS NFV-IFA 013 clause 8.3.3.2.2, which can be found at

https://www.etsi.org/deliver/etsi\_gs/NFV-IFA/001\_099/013

/03.04.01\_60/gs\_NFV-IFA013v030401p.pdf page 123-124";

leaf nSInstanceId {

description "Uniquely identifies the NS instance.";

config false;

type ETSI-GS-NFV-Identifier;

}

leaf nsName {

description "Human readable name of the NS instance.";

type string;

config false;

}

leaf description {

description "Human readable description of the NS instance.";

config false;

type string;

}

}

grouping NetworkSliceSubnetGrp {

uses subnet3gpp:SubNetworkGrp;

uses EPTransportGrp;

leaf operationalState {

description "The operational state of the network slice instance.

It describes whether or not the resource is physically installed

and working.";

mandatory true;

config false;

type types3gpp:OperationalState;

}

leaf administrativeState {

description "The administrative state of the network slice instance.

It describes the permission to use or prohibition against

using the instance, imposed through the OAM services.";

mandatory true;

type types3gpp:AdministrativeState;

}

list nsInfo {

description "This list represents the properties of network service

information corresponding to the network slice subnet instance.";

reference "ETSI GS NFV-IFA 013 clause 8.3.3.2.2";

config false;

key nSInstanceId;

max-elements 1;

uses NsInfoGrp;

}

list sliceProfileList {

description "List of SliceProfiles supported by the network slice

subnet instance. All members of the list, instances of SliceProfile,

shall contain the same datatype representing slice profile requirements:

TopSliceSubnetProfile, RANSliceSubnetProfile or CNSliceSubnetProfile.

Members of the list may contain TopSliceSubnetProfile datatype

only when this attribute (sliceProfileList) belongs to

a NetworkSliceSubnet that is directly referenced by a NetworkSlice";

key sliceProfileId;

uses SliceProfileGrp;

}

list managedFunctionRef {

description "The managed functions that the NetworkSliceSubnet is

associated with.";

key aggregatedManagedFunction;

leaf aggregatedManagedFunction {

type instance-identifier;

}

}

leaf-list networkSliceSubnetRef {

type leafref {

path /NetworkSliceSubnet/id;

}

description "Lists the NetworkSliceSubnet instances associated with

this NetworkSliceSubnet.";

}

}

list NetworkSliceSubnet {

description "Represents the properties of a network slice subnet

instance in a 5G network.";

key id;

container attributes {

uses NetworkSliceSubnetGrp;

leaf-list parents {

description "Reference to direct parent NetworkSliceSubnet

instances.

If NetworkSliceSubnets form a containment hierarchy this is

modeled using references between the child NetworkSliceSubnet

and the parent NetworkSliceSubnet.

This reference MUST NOT be present for the top level

NetworkSliceSubnet and MUST be present for other

NetworkSliceSubnets.";

type leafref {

path "/NetworkSliceSubnet/id";

}

}

leaf-list containedChildren {

description "Reference to all directly contained NetworkSliceSubnet

instances. If NetworkSliceSubnets form a containment hierarchy

this is modeled using references between the child

NetworkSliceSubnet and the parent NetworkSliceSubnet.";

type leafref {

path "/NetworkSliceSubnet/id";

}

}

}

uses top3gpp:Top\_Grp;

uses meas3gpp:MeasurementSubtree {

if-feature MeasurementsUnderNetworkSliceSubnet;

}

}

}

<CODE ENDS>

## N.2.3 Void

## N.2.4 module \_3gpp-ns-nrm-serviceprofile.yang

<CODE BEGINS>

submodule \_3gpp-ns-nrm-serviceprofile {

yang-version 1.1;

belongs-to \_3gpp-ns-nrm-networkslice { prefix ns3gpp; }

import \_3gpp-common-yang-types { prefix types3gpp; }

import \_3gpp-5g-common-yang-types { prefix types5g3gpp; }

import \_3gpp-ns-nrm-common { prefix ns3cmn; }

organization "3GPP SA5";

contact

"https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";

description "A network slice instance in a 5G network.";

reference "3GPP TS 28.541

Management and orchestration;

5G Network Resource Model (NRM);

Information model definitions for network slice NRM (chapter 6)

";

revision 2020-06-02 {

reference "CR-0485, CR-0508";

}

revision 2020-02-19 {

description "Introduction of YANG definitions for network slice NRM";

reference "CR-0458";

}

revision 2019-06-23 {

description "Initial revision";

reference "3GPP TS 28.541 V15.X.XX";

}

typedef availability-percentage {

description "

Percentage value of the amount of time the end-to-end communication

service is delivered according to an agreed QoS, divided by the amount

of time the system is expected to deliver the end-to-end service

according to the specification in a specific area.";

reference "3GPP TS 22.261 3.1";

type decimal64 {

fraction-digits 4; // E.g. 99.9999

range 0..100;

}

}

typedef V2XMode-enum {

type enumeration {

enum NOT\_SUPPORTED;

enum SUPPORTED\_BY\_NR;

}

}

grouping ServiceProfileGrp {

leaf serviceProfileId {

description "Service profile identifier.";

type types3gpp:DistinguishedName;

}

list sNSSAIList {

description "The S-NSSAI list to be supported by the new NSI to be

created or the existing NSI to be re-used.";

min-elements 1;

key idx;

unique "sst sd";

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses types5g3gpp:SNssai;

}

list pLMNIdList {

description "List of PLMN IDs.";

min-elements 1;

key "mcc mnc";

ordered-by user;

uses types3gpp:PLMNId;

}

leaf maxNumberofUEs {

description "The maximum number of UEs that may simultaneously

access the network slice instance.";

mandatory true;

type uint64;

}

leaf-list coverageArea {

min-elements 1;

description "A list of TrackingAreas where the NSI can be selected.";

type types3gpp:Tac;

}

leaf latency {

description "The packet transmission latency (milliseconds) through

the RAN, CN, and TN part of 5G network, used to evaluate utilization

performance of the end-to-end network slice instance.";

reference "3GPP TS 28.554 clause 6.3.1";

mandatory true;

type uint16;

units milliseconds;

}

leaf uEMobilityLevel {

description "The mobility level of UE accessing the network slice

instance.";

reference "3GPP TS 22.261 clause 6.2.1";

type types3gpp:UeMobilityLevel;

}

leaf resourceSharingLevel {

description "Specifies whether the resources to be allocated to the

network slice instance may be shared with another network slice

instance(s).";

type types3gpp:ResourceSharingLevel;

}

//Stage2 issue: The sNSSAIList above specifies one or potentially

// several sST objects for the service profile.

// How do they relate?

leaf sST {

description "Specifies the slice/service type. See 3GPP TS 23.501

for defined values.";

mandatory true;

type uint32;

reference "3GPP TS 23.501 5.15.2.2";

}

leaf availability {

description "The availability requirement for a network slice

instance, expressed as a percentage.";

type availability-percentage;

}

list delayTolerance {

description "An attribute specifies the properties of service delivery

flexibility, especially for the vertical services that are not

chasing a high system performance.";

reference "TS 22.104 clause 4.3";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn:ServAttrComGrp;

}

leaf support {

description "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.";

type ns3cmn:Support-enum;

}

}

list deterministicComm {

//Stage2 issue: deterministicComm is not defined in 28.541 chapter 6,

// but I guess deterministicComm is meant

description "This list represents the properties of the deterministic

communication for periodic user traffic. Periodic traffic refers to the

type of traffic with periodic transmissions.";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn:ServAttrComGrp;

}

leaf availability {

//Stage2 issue: Defined differently in 28.541 chapter 6, but XML

// uses DeterministicCommAvailability

config false;

type ns3cmn:DeterminCommAvailability;

}

leaf periodicityList {

//Stage2 issue: Not defined in 28.541 chapter 6. XML and YAML

// says "string".

type string;

}

}

list dLThptPerSlice {

description "This attribute defines achievable data rate of the

network slice in downlink that is available ubiquitously across

the coverage area of the slice";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn:XLThptGrp;

}

list dLThptPerUE {

description "This attribute defines data rate supported by the network

slice per UE";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn:XLThptGrp;

}

list uLThptPerSlice {

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

description "This attribute defines achievable data rate of the

network slice in uplink that is available ubiquitously across

the coverage area of the slice";

uses ns3cmn:XLThptGrp;

}

list uLThptPerUE {

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

description "This attribute defines data rate supported by the

network slice per UE";

uses ns3cmn:XLThptGrp;

}

list maxPktSize {

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

description "This parameter specifies the maximum packet size

supported by the network slice";

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn:ServAttrComGrp;

}

leaf maxSize {

//Stage2 issue: Not defined in 28.541, guessing integer bytes

type uint32;

units bytes;

}

}

list maxNumberofPDUSessions {

description "Represents the maximum number of

concurrent PDU sessions supported by the network slice";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn:ServAttrComGrp;

}

leaf nOofPDUSessions {

//Stage2 issue: Not defined in 28.541, guessing integer

type uint32;

}

}

list kPIMonitoring {

description "Represents performance monitoring";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn:ServAttrComGrp;

}

leaf kPIList {

//Stage2 issue: Data format not specified, low interoperability

description "An attribute specifies the name list of KQIs and KPIs

available for performance monitoring";

type string;

}

}

list userMgmtOpen {

description "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.";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn:ServAttrComGrp;

}

leaf support {

type ns3cmn:Support-enum;

}

}

list v2XCommModels {

description "An attribute specifies whether or not the V2X

communication mode is supported by the network slice.";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn:ServAttrComGrp;

}

leaf v2XMode {

type V2XMode-enum;

}

}

list termDensity {

description "An attribute specifies the overall user density over

the coverage area of the network slice";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn:ServAttrComGrp;

}

leaf density {

type uint32;

units users/km2;

}

}

leaf activityFactor {

//Stage2 issue: This is modeled as writable/config true in 28.542,

// but that does not appear to match the description

description "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";

reference "TS 22.261 Table 7.1-1";

type decimal64 {

fraction-digits 1;

}

}

leaf uESpeed {

//Stage2 issue: This is modeled as writable/config true in 28.542,

// but that does not appear to match the description

description "An attribute specifies the maximum speed (in km/hour)

supported by the network slice at which a defined QoS can be

achieved";

type uint32;

units km/h;

}

leaf jitter {

//Stage2 issue: This is modeled as writable/config true in 28.542,

// but that does not appear to match the description

description "An attribute specifies the deviation from the desired

value to the actual value when assessing time parameters";

reference "TS 22.104 clause C.4.1";

type uint32;

units microseconds;

}

leaf survivalTime {

description "An attribute specifies the time that an application

consuming a communication service may continue without an

anticipated message.";

reference "TS 22.104 clause 5";

type string;

}

leaf reliability {

description "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.";

reference "TS 22.261, TS 22.104";

type string;

}

leaf maxDLDataVolume {

//Stage2 issue: Not defined in 28.541. XML and YAML says "string"

type string;

}

leaf maxULDataVolume {

//Stage2 issue: Not defined in 28.541. XML and YAML says "string"

type string;

}

list nBIoT {

description "An attribute specifies whether NB-IoT is supported in

the RAN in the network slice";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn:ServAttrComGrp;

}

leaf support {

description "An attribute specifies whether NB-IoT is supported

in the RAN in the network slice";

type ns3cmn:Support-enum;

}

}

}

}

<CODE ENDS>

## N.2.5 module \_3gpp-ns-nrm-sliceprofile.yang

<CODE BEGINS>

submodule \_3gpp-ns-nrm-sliceprofile {

yang-version 1.1;

belongs-to \_3gpp-ns-nrm-networkslicesubnet { prefix nss3gpp; }

import \_3gpp-common-yang-types { prefix types3gpp; }

import \_3gpp-5g-common-yang-types { prefix types5g3gpp; }

// import \_3gpp-ns-nrm-networkslice { prefix ns3gpp; }

import \_3gpp-ns-nrm-common { prefix ns3cmn3gpp; }

organization "3GPP SA5";

contact

"https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";

description "Represents the properties of network slice subnet related

requirement that should be supported by the network slice subnet

instance in a 5G network.";

reference "3GPP TS 28.541

Management and orchestration;

5G Network Resource Model (NRM);

Information model definitions for network slice NRM (chapter 6)

";

revision 2021-07-16 { reference CR-0566 ; }

revision 2021-05-05 {

description "replace perfReq with 3 new datatypes xxxSliceSubnetProfile";

reference "CR-0485";

}

revision 2020-02-19 {

description "Introduction of YANG definitions for network slice NRM";

reference "CR-0458";

}

revision 2019-05-27 {

description "initial revision.";

reference "Based on

3GPP TS 28.541 V15.X.XX";

}

typedef SliceSimultaneousUse-enum {

type enumeration {

enum ZERO;

enum ONE;

enum TWO;

enum THREE;

enum FOUR;

}

}

typedef ServiceType-enum {

type enumeration {

enum eMBB;

enum URLLC;

enum MIoT;

enum V2X;

}

}

grouping PositioningGrp {

description "Represents positioning support.";

reference "Clause 3.4.20 of GSMA NG.116 ";

uses ns3cmn3gpp:ServAttrComGrp ;

leaf-list availability {

type enumeration {

enum CIDE\_CID ;

enum OTDOA;

enum RF\_FINGERPRINTING;

enum AECID;

enum HYBRID\_POSITIONING;

enum NET\_RTK;

}

min-elements 1;

config false;

description "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. Values allowed: are

CIDE-CID (LTE and NR), OTDOA (LTE and NR), RF fingerprinting, AECID,

Hybrid positioning, NET-RTK.";

}

leaf predictionfrequency {

type enumeration {

enum PERSEC;

enum PERMIN;

enum PERHOUR;

}

mandatory true;

description "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.

If leaf-list availability is empty, the value has no meaning.";

reference "NG.116";

}

leaf accuracy {

type decimal64 {

fraction-digits 2;

}

units meter;

mandatory true;

description "Specifies the accuracy of the location information.

Accuracy depends on the respective positioning solution applied in the

RAN domain of the network slice.";

reference "NG.116";

}

}

grouping TopSliceSubnetProfileGrp {

leaf-list coverageArea {

min-elements 1;

description "A list of TrackingAreas where the NSI can be selected.";

type types3gpp:Tac;

}

leaf latency {

description "The packet transmission latency (milliseconds) through

the RAN, CN, and TN part of 5G network, used to evaluate

utilization performance of the end-to-end network slice instance.";

reference "3GPP TS 28.554 clause 6.3.1";

//optional support

mandatory true;

type uint16;

units milliseconds;

}

leaf maxNumberofUEs {

description "Specifies the maximum number of UEs may simultaneously

access the network slice instance.";

//optional support

mandatory true;

type uint64;

}

list dLThptPerSliceSubnet {

description "This attribute defines achievable data rate of the

network slice subnet in downlink that is available ubiquitously

across the coverage area of the slice";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:XLThptGrp;

}

list dLThptPerUE {

description "This attribute defines data rate supported by the

network slice per UE, refer NG.116.";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:XLThptGrp;

}

list uLThptPerSliceSubnet {

description "This attribute defines achievable data rate of the

network slice subnet in uplink that is available ubiquitously

across the coverage area of the slice";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:XLThptGrp;

}

list uLThptPerUE {

description "This attribute defines data rate supported by the

network slice per UE, refer NG.116";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:XLThptGrp;

}

list maxPktSize {

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

description "This parameter specifies the maximum packet size

supported by the network slice";

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf maxSize {

//Stage2 issue: Not defined in 28.541, guessing integer bytes

type uint32;

units bytes;

}

}

list maxNumberofPDUSessions {

description "Represents the maximum number of

concurrent PDU sessions supported by the network slice";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf nOofPDUSessions {

//Stage2 issue: Not defined in 28.541, guessing integer

type uint32;

}

}

leaf sliceSimultaneousUse {

description "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.";

type SliceSimultaneousUse-enum;

}

list delayTolerance {

description "An attribute specifies the properties of service delivery

flexibility, especially for the vertical services that are not

chasing a high system performance.";

reference "TS 22.104 clause 4.3";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf support {

description "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.";

type ns3cmn3gpp:Support-enum;

}

}

list termDensity {

description "An attribute specifies the overall user density over

the coverage area of the network slice";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf density {

type uint32;

units users/km2;

}

}

leaf activityFactor {

//Stage2 issue: This is modeled as writable/config true in 28.542,

// but that does not appear to match the description

description "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";

reference "TS 22.261 Table 7.1-1";

type decimal64 {

fraction-digits 1;

}

}

leaf-list coverageAreaTAList {

description "A list of TrackingAreas where the NSI can be selected.";

//optional support

min-elements 1;

type types3gpp:Tac;

}

leaf uEMobilityLevel {

description "The mobility level of UE accessing the network slice

instance.";

//optional support

type types3gpp:UeMobilityLevel;

}

leaf resourceSharingLevel {

description "Specifies whether the resources to be allocated to the

network slice subnet instance may be shared with another network

slice subnet instance(s).";

//optional support

type types3gpp:ResourceSharingLevel;

}

leaf uESpeed {

//Stage2 issue: This is modeled as writable/config true in 28.542,

// but that does not appear to match the description

description "An attribute specifies the maximum speed (in km/hour)

supported by the network slice at which a defined QoS can be

achieved";

type uint32;

units km/h;

}

leaf reliability {

description "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.";

reference "TS 22.261, TS 22.104";

type string;

}

leaf serviceType {

description "An attribute specifies the standardized network slice type.

allowedValues: eMBB, URLLC, MIoT, V2X.";

type ServiceType-enum;

}

list deterministicComm {

//Stage2 issue: deterministicComm is not defined in 28.541 chapter 6,

// but I guess determinComm is meant

description "This list represents the properties of the deterministic

communication for periodic user traffic. Periodic traffic refers to the

type of traffic with periodic transmissions.";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf availability {

//Stage2 issue: Defined differently in 28.541 chapter 6, but XML

// uses DeterminCommAvailability

config false;

type ns3cmn3gpp:DeterminCommAvailability;

}

leaf periodicityList {

//Stage2 issue: Not defined in 28.541 chapter 6. XML and YAML

// says "string".

type string;

}

}

leaf survivalTime {

description "An attribute specifies the time that an application

consuming a communication service may continue without an

anticipated message.";

reference "TS 22.104 clause 5";

type string;

}

list positioning {

key predictionfrequency;

min-elements 1;

max-elements 1;

description "Specifies whether the network slice provides

geo-localization methods or supporting methods";

reference "Clause 3.4.20 of NG.116";

uses PositioningGrp;

}

}

grouping CNSliceSubnetProfileGrp {

leaf-list coverageArea {

min-elements 1;

description "A list of TrackingAreas where the NSI can be selected.";

type types3gpp:Tac;

}

leaf latency {

description "The packet transmission latency (milliseconds) through

the RAN, CN, and TN part of 5G network, used to evaluate

utilization performance of the end-to-end network slice instance.";

reference "3GPP TS 28.554 clause 6.3.1";

//optional support

mandatory true;

type uint16;

units milliseconds;

}

leaf maxNumberofUEs {

description "Specifies the maximum number of UEs may simultaneously

access the network slice instance.";

//optional support

mandatory true;

type uint64;

}

list dLThptPerSliceSubnet {

description "This attribute defines achievable data rate of the

network slice subnet in downlink that is available ubiquitously

across the coverage area of the slice";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:XLThptGrp;

}

list dLThptPerUE {

description "This attribute defines data rate supported by the

network slice per UE, refer NG.116.";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:XLThptGrp;

}

list uLThptPerSliceSubnet {

description "This attribute defines achievable data rate of the

network slice subnet in uplink that is available ubiquitously

across the coverage area of the slice";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:XLThptGrp;

}

list uLThptPerUE {

description "This attribute defines data rate supported by the

network slice per UE, refer NG.116";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:XLThptGrp;

}

list maxPktSize {

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

description "This parameter specifies the maximum packet size

supported by the network slice";

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf maxSize {

//Stage2 issue: Not defined in 28.541, guessing integer bytes

type uint32;

units bytes;

}

}

list maxNumberofPDUSessions {

description "Represents the maximum number of

concurrent PDU sessions supported by the network slice";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf nOofPDUSessions {

//Stage2 issue: Not defined in 28.541, guessing integer

type uint32;

}

}

leaf sliceSimultaneousUse {

description "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.";

type SliceSimultaneousUse-enum;

}

list delayTolerance {

description "An attribute specifies the properties of service delivery

flexibility, especially for the vertical services that are not

chasing a high system performance.";

reference "TS 22.104 clause 4.3";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf support {

description "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.";

type ns3cmn3gpp:Support-enum;

}

}

leaf-list coverageAreaTAList {

description "A list of TrackingAreas where the NSI can be selected.";

//optional support

min-elements 1;

type types3gpp:Tac;

}

leaf resourceSharingLevel {

description "Specifies whether the resources to be allocated to the

network slice subnet instance may be shared with another network

slice subnet instance(s).";

//optional support

type types3gpp:ResourceSharingLevel;

}

list deterministicComm {

//Stage2 issue: deterministicComm is not defined in 28.541 chapter 6,

// but I guess determinComm is meant

description "This list represents the properties of the deterministic

communication for periodic user traffic. Periodic traffic refers to the

type of traffic with periodic transmissions.";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf availability {

//Stage2 issue: Defined differently in 28.541 chapter 6, but XML

// uses DeterminCommAvailability

config false;

type ns3cmn3gpp:DeterminCommAvailability;

}

leaf periodicityList {

//Stage2 issue: Not defined in 28.541 chapter 6. XML and YAML

// says "string".

type string;

}

}

}

grouping PositioningRANSubnetGrp {

description "Represents positioning support in RAN domain";

leaf-list availability {

type enumeration {

enum CIDE\_CID ;

enum OTDOA;

enum RF\_FINGERPRINTING;

enum AECID;

enum HYBRID\_POSITIONING;

enum NET\_RTK;

}

config false;

description "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. Values allowed: are

CIDE-CID (LTE and NR), OTDOA (LTE and NR), RF fingerprinting, AECID,

Hybrid positioning, NET-RTK.";

}

leaf predictionfrequency {

type enumeration {

enum PERSEC;

enum PERMIN;

enum PERHOUR;

}

mandatory true;

description "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.

If leaf-list availability is empty, the value has no meaning.";

reference "NG.116";

}

leaf accuracy {

type decimal64 {

fraction-digits 2;

}

units meter;

mandatory true;

description "Specifies the accuracy of the location information.

Accuracy depends on the respective positioning solution applied in the

RAN domain of the network slice.";

reference "NG.116";

}

}

grouping RANSliceSubnetProfileGrp {

description "Represents the RANSliceSubnetProfile datatype";

leaf latency {

description "The packet transmission latency (milliseconds) through

the RAN, CN, and TN part of 5G network, used to evaluate

utilization performance of the end-to-end network slice instance.";

reference "3GPP TS 28.554 clause 6.3.1";

//optional support

mandatory true;

type uint16;

units milliseconds;

}

leaf maxNumberofUEs {

description "Specifies the maximum number of UEs may simultaneously

access the network slice instance.";

//optional support

mandatory true;

type uint64;

}

list dLThptPerSliceSubnet {

description "This attribute defines achievable data rate of the

network slice subnet in downlink that is available ubiquitously

across the coverage area of the slice";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:XLThptGrp;

}

list dLThptPerUE {

description "This attribute defines data rate supported by the

network slice per UE, refer NG.116.";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:XLThptGrp;

}

list uLThptPerSliceSubnet {

description "This attribute defines achievable data rate of the

network slice subnet in uplink that is available ubiquitously

across the coverage area of the slice";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:XLThptGrp;

}

list uLThptPerUE {

description "This attribute defines data rate supported by the

network slice per UE, refer NG.116";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:XLThptGrp;

}

list maxPktSize {

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

description "This parameter specifies the maximum packet size

supported by the network slice";

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf maxSize {

//Stage2 issue: Not defined in 28.541, guessing integer bytes

type uint32;

units bytes;

}

}

list delayTolerance {

description "An attribute specifies the properties of service delivery

flexibility, especially for the vertical services that are not

chasing a high system performance.";

reference "TS 22.104 clause 4.3";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf support {

description "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.";

type ns3cmn3gpp:Support-enum;

}

}

leaf sliceSimultaneousUse {

description "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.";

type SliceSimultaneousUse-enum;

}

list termDensity {

description "An attribute specifies the overall user density over

the coverage area of the network slice";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf density {

type uint32;

units users/km2;

}

}

leaf activityFactor {

//Stage2 issue: This is modeled as writable/config true in 28.542,

// but that does not appear to match the description

description "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";

reference "TS 22.261 Table 7.1-1";

type decimal64 {

fraction-digits 1;

}

}

leaf-list coverageAreaTAList {

description "A list of TrackingAreas where the NSI can be selected.";

//optional support

min-elements 1;

type types3gpp:Tac;

}

leaf uEMobilityLevel {

description "The mobility level of UE accessing the network slice

instance.";

//optional support

type types3gpp:UeMobilityLevel;

}

leaf resourceSharingLevel {

description "Specifies whether the resources to be allocated to the

network slice subnet instance may be shared with another network

slice subnet instance(s).";

//optional support

type types3gpp:ResourceSharingLevel;

}

leaf uESpeed {

//Stage2 issue: This is modeled as writable/config true in 28.542,

// but that does not appear to match the description

description "An attribute specifies the maximum speed (in km/hour)

supported by the network slice at which a defined QoS can be

achieved";

type uint32;

units km/h;

}

leaf reliability {

description "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.";

reference "TS 22.261, TS 22.104";

type string;

}

leaf serviceType {

description "An attribute specifies the standardized network slice type.

allowedValues: eMBB, URLLC, MIoT, V2X.";

type ServiceType-enum;

}

list deterministicComm {

//Stage2 issue: deterministicComm is not defined in 28.541 chapter 6,

// but I guess determinComm is meant

description "This list represents the properties of the deterministic

communication for periodic user traffic. Periodic traffic refers to the

type of traffic with periodic transmissions.";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ns3cmn3gpp:ServAttrComGrp;

}

leaf availability {

//Stage2 issue: Defined differently in 28.541 chapter 6, but XML

// uses DeterminCommAvailability

config false;

type ns3cmn3gpp:DeterminCommAvailability;

}

leaf periodicityList {

//Stage2 issue: Not defined in 28.541 chapter 6. XML and YAML

// says "string".

type string;

}

}

leaf survivalTime {

description "An attribute specifies the time that an application

consuming a communication service may continue without an

anticipated message.";

reference "TS 22.104 clause 5";

type string;

}

list positioning {

min-elements 1;

max-elements 1;

description "Specifies whether the RAN domain of the network slice

provides geo-localization methods or supporting methods.";

reference "Clause 3.4.20 of NG.116 [50].";

uses PositioningRANSubnetGrp;

}

}

grouping SliceProfileGrp {

leaf sliceProfileId {

description "A unique identifier of the property of network slice

subnet related requirement should be supported by the network

slice subnet instance.";

type types3gpp:DistinguishedName;

}

list sNSSAIList {

description "List of S-NSSAIs the managed object is capable of

supporting. (Single Network Slice Selection Assistance Information)

An S-NSSAI has an SST (Slice/Service type) and an optional SD

(Slice Differentiator) field.";

key idx;

unique "sst sd";

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses types5g3gpp:SNssai;

}

list pLMNIdList {

description "List of at most six entries of PLMN Identifiers, but at

least one (the primary PLMN Id). The PLMN Identifier is composed

of a Mobile Country Code (MCC) and a Mobile Network Code (MNC).";

min-elements 1;

max-elements 6;

key "mcc mnc";

ordered-by user;

uses types3gpp:PLMNId;

}

leaf maxNumberofUEs {

description "Specifies the maximum number of UEs may simultaneously

access the network slice instance.";

//optional support

mandatory true;

type uint64;

}

leaf-list coverageAreaTAList {

description "A list of TrackingAreas where the NSI can be selected.";

//optional support

min-elements 1;

type types3gpp:Tac;

}

leaf latency {

description "The packet transmission latency (milliseconds) through

the RAN, CN, and TN part of 5G network, used to evaluate

utilization performance of the end-to-end network slice instance.";

reference "3GPP TS 28.554 clause 6.3.1";

//optional support

mandatory true;

type uint16;

units milliseconds;

}

leaf uEMobilityLevel {

description "The mobility level of UE accessing the network slice

instance.";

//optional support

type types3gpp:UeMobilityLevel;

}

leaf resourceSharingLevel {

description "Specifies whether the resources to be allocated to the

network slice subnet instance may be shared with another network

slice subnet instance(s).";

//optional support

type types3gpp:ResourceSharingLevel;

}

list CNSliceSubnetProfile {

description " This represents the requirements for the top slice associated with the

network slice. ";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses TopSliceSubnetProfileGrp;

}

list RANSliceSubnetProfile {

description " This represents the requirements for the top slice associated with the

network slice. ";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses TopSliceSubnetProfileGrp;

}

list TopSliceSubnetProfile {

description " This represents the requirements for the top slice associated with the

network slice. ";

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses TopSliceSubnetProfileGrp;

}

}

}

<CODE ENDS>

## N.2.6 module \_3gpp-ns-nrm-common.yang

<CODE BEGINS>

module \_3gpp-ns-nrm-common {

yang-version 1.1;

namespace urn:3gpp:sa5:\_3gpp-ns-nrm-common;

prefix ns3cmn3gpp;

// import \_3gpp-common-subnetwork { prefix subnet3gpp; }

// import \_3gpp-common-yang-types { prefix types3gpp; }

// import \_3gpp-common-top { prefix top3gpp; }

organization "3GPP SA5";

contact

"https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";

description "Common network slice definitions";

reference "3GPP TS 28.541

Management and orchestration;

5G Network Resource Model (NRM);

Information model definitions for network slice NRM (chapter 6)

";

revision 2021-07-16 { reference CR-0566 ; }

revision 2021-05-17 {

description "Introduction of Common Data types";

reference "CR-0485";

}

grouping XLThptGrp {

list servAttrCom {

description "This list represents the common properties of service

requirement related attributes.";

reference "GSMA NG.116 corresponding to Attribute categories,

tagging and exposure";

config false;

key idx;

max-elements 1;

leaf idx {

description "Synthetic index for the element.";

type uint32;

}

uses ServAttrComGrp;

}

leaf guaThpt {

description "This attribute describes the guaranteed data rate.";

type uint64;

units kbits/s;

}

leaf maxThpt {

description "This attribute describes the maximum data rate.";

type uint64;

units kbits/s;

}

}

typedef Tagging-enum {

type enumeration {

enum performance;

enum function;

enum operation;

}

}

typedef Exposure-enum {

type enumeration {

enum API;

enum KPI;

}

}

typedef Category-enum {

type enumeration {

enum character;

enum scalability;

}

}

typedef Support-enum {

type enumeration {

enum NOT\_SUPPORTED;

enum SUPPORTED;

}

}

grouping ServAttrComGrp {

leaf category {

description "This attribute specifies the category of a service

requirement/attribute of GST";

type Category-enum;

config false;

}

leaf-list tagging {

description "This attribute specifies the tagging of a service

requirement/attribute of GST in character category";

when "../category = 'character'";

type Tagging-enum;

config false;

}

leaf exposure {

description "This attribute specifies exposure mode of a service

requirement/attribute of GST";

type Exposure-enum;

config false;

}

}

typedef DeterminCommAvailability {

type Support-enum;

}

}

<CODE ENDS>

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