**3GPP TSG-SA5 Meeting #144-e *S5-224159rev1***

**e-meeting, 27 June - 1 July 2022**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **28.541** | **CR** | **DraftCR** | **rev** | **-** | **Current version:** | **17.6.0** |  |
|  | | | | | | | | |
| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <http://www.3gpp.org/Change-Requests>.* | | | | | | | | |
|  | | | | | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Add missing pLMNInfoList attribute for OperatorDU and GNBDUFunction | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | S5 | | | | | | | | | |
| ***Source to TSG:*** | China Unicom | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | AdNRM\_ph2 | | | | |  | ***Date:*** | | | 2022-06 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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:*** | | In TS 28.541, the OperatorDU IOC and GNBDUFunction IOC are defined. However, the pLMNInfoList attribute in these IOCs is missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add pLMNInfoList attribute for OperatorDU IOC and GNBDUFunction IOC | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

|  |
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| **1st Change** |

4.3.1 GNBDUFunction

4.3.1.1 Definition

For non-split NG-RAN deployment scenario, this IOC together with GNBCUCPFunction IOC and GNBCUUPFunction IOC provide the management of gNB defined in clause 6.1.1 in 3GPP TS 38.401 [4].

For 2-split and 3-split NG-RAN architecture, this IOC provides the management representation of gNB-DU defined in clause 6.1.1 in 3GPP TS 38.401 [4].

The following table identifies the necessary end points required for the representation of gNB and en-gNB, of all deployment scenarios.

|  |  |  |  |
| --- | --- | --- | --- |
| **Req**  **Role** | **End point requirement for 3-split deployment scenario** | **End point requirement for 2-split deployment scenario** | **End point requirement for Non-split deployment scenario** |
| gNB | <<IOC>>EP\_F1C, <<IOC>>EP\_F1U | <<IOC>>EP\_F1C, <<IOC>>EP\_F1U | None. |
| en-gNB | <<IOC>>EP\_F1C, <<IOC>>EP\_F1U | <<IOC>>EP\_F1C, <<IOC>>EP\_F1U | None. |

4.3.1.2 Attributes

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **S** | **isReadable** | **isWritable** | **isInvariant** | **isNotifyable** |
| gNB­DUId | M | T | T | F | T |
| gNBDUName | O | T | T | F | T |
| gNBId | CM | T | T | F | T |
| gNBIdLength | CM | T | T | F | T |
| rimRSReportConf | O | T | F | T | T |
| pLMNInfoList | CM | T | T | F | T |

#### 4.3.1.3 Attribute constraints

|  |  |
| --- | --- |
| Name | Definition |
| pLMNInfoList S | Condition: The NG-RAN Multi-Operator Core Network (NG-RAN MOCN) network sharing with multiple Cell Identity broadcast feature is supported. |

|  |
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| **2nd Change** |

4.3.67 OperatorDU

4.3.67.1 Definition

This IOC contains attributes to support the NG-RAN Multi-Operator Core Network (NG-RAN MOCN) network sharing with multiple Cell Identity broadcast feature. An instance of OperatorDU <<IOC>> should be created and configured for each POP. When configured the attributes override those in parent GNBDUFunction instance.

The OperatorDU <<IOC>> is only used to support MOCN with multiple cell identity broadcast feature. If MOCN with multiple cell identity broadcast feature is not supported, is not used.

The following table identifies the necessary end points required for the representation of shared gNB and shared en-gNB, of all deployment scenarios.

|  |  |  |  |
| --- | --- | --- | --- |
| **Req**  **Role** | **End point requirement for 3-split deployment scenario** | **End point requirement for 2-split deployment scenario** | **End point requirement for Non-split deployment scenario** |
| Shared gNB | <<IOC>>EP\_F1C, <<IOC>>EP\_F1U | <<IOC>>EP\_F1C, <<IOC>>EP\_F1U | None. |
| Shared en-gNB | <<IOC>>EP\_F1C, <<IOC>>EP\_F1U | <<IOC>>EP\_F1C, <<IOC>>EP\_F1U | None. |

For scenarios with an F1 interface supporting multiple PLMN broadcast, the values of the EP\_F1C and EP\_F1U attributes contained by different OperatorDU of the same GNBDUFunction should be same.

4.3.67.2 Attributes

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **S** | **isReadable** | **isWritable** | **isInvariant** | **isNotifyable** |
| gNBId | M | T | T | F | T |
| gNBIdLength | M | T | T | F | T |
| pLMNInfoList | M | T | T | F | T |

|  |
| --- |
| **Start of Change** |

## D.4.3 OpenAPI document "TS28541\_NrNrm.yaml"

openapi: 3.0.1

info:

title: NR NRM

version: 17.7.0

description: >-

OAS 3.0.1 specification of the NR NRM

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externalDocs:

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

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

paths: {}

components:

schemas:

#-------- Definition of types-----------------------------------------------------

GnbId:

type: string

GnbIdLength:

type: integer

minimum: 22

maximum: 32

GnbName:

type: string

maxLength: 150

GnbDuId:

type: number

minimum: 0

maximum: 68719476735

GnbCuUpId:

type: number

minimum: 0

maximum: 68719476735

Sst:

type: integer

maximum: 255

Snssai:

type: object

properties:

sst:

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

sd:

type: string

Mnc:

type: string

pattern: '[0-9]{3}|[0-9]{2}'

PlmnId:

type: object

properties:

mcc:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Mcc'

mnc:

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

PlmnIdList:

type: array

items:

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

PlmnInfo:

type: object

properties:

plmnId:

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

snssai:

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

PlmnInfoList:

type: array

items:

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

cagId:

type: string

nid:

type: string

NpnIdentity:

type: object

properties:

plmnId:

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

cagidList:

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

nidList:

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

NpnIdentityList:

type: array

items:

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

GGnbId:

type: string

pattern: '^[0-9]{3}[0-9]{2,3}-(22|23|24|25|26|27|28|29|30|31|32)-[0-9]{1,10}'

GEnbId:

type: string

pattern: '^[0-9]{3}[0-9]{2,3}-(18|20|21|22)-[0-9]{1,7}'

GGnbIdList:

type: array

items:

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

GEnbIdList:

type: array

items:

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

NrPci:

type: integer

maximum: 503

NrTac:

type: integer

maximum: 16777215

Tai:

type: object

properties:

plmnId:

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

nrTac:

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

TaiList:

type: array

items:

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

BackhaulAddress:

type: object

properties:

gnbId:

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

tai:

$ref: "#/components/schemas/Tai"

MappingSetIDBackhaulAddress:

type: object

properties:

setID:

type: integer

backhaulAddress:

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

IntraRatEsActivationOriginalCellLoadParameters:

type: object

properties:

loadThreshold:

type: integer

timeDuration:

type: integer

IntraRatEsActivationCandidateCellsLoadParameters:

type: object

properties:

loadThreshold:

type: integer

timeDuration:

type: integer

IntraRatEsDeactivationCandidateCellsLoadParameters:

type: object

properties:

loadThreshold:

type: integer

timeDuration:

type: integer

EsNotAllowedTimePeriod:

type: object

properties:

startTimeandendTime:

type: string

periodOfDay:

type: string

daysOfWeekList:

type: string

listoftimeperiods:

type: string

InterRatEsActivationOriginalCellParameters:

type: object

properties:

loadThreshold:

type: integer

timeDuration:

type: integer

InterRatEsActivationCandidateCellParameters:

type: object

properties:

loadThreshold:

type: integer

timeDuration:

type: integer

InterRatEsDeactivationCandidateCellParameters:

type: object

properties:

loadThreshold:

type: integer

timeDuration:

type: integer

UeAccProbilityDist:

type: object

properties:

targetProbability:

type: integer

numberofpreamblessent:

type: integer

UeAccDelayProbilityDist:

type: object

properties:

targetProbability:

type: integer

accessdelay:

type: integer

NRPciList:

type: object

properties:

NRPci:

type: integer

CSonPciList:

type: object

properties:

NRPci:

type: integer

MaximumDeviationHoTrigger:

type: integer

minimum: -20

maximum: 20

MaximumDeviationHoTriggerLow:

type: integer

minimum: -20

maximum: 20

MaximumDeviationHoTriggerHigh:

type: integer

minimum: -20

maximum: 20

MinimumTimeBetweenHoTriggerChange:

type: integer

minimum: 0

maximum: 604800

TstoreUEcntxt:

type: integer

minimum: 0

maximum: 1023

CellState:

type: string

enum:

- IDLE

- INACTIVE

- ACTIVE

CyclicPrefix:

type: string

enum:

- '15'

- '30'

- '60'

- '120'

TxDirection:

type: string

enum:

- DL

- UL

- DL and UL

BwpContext:

type: string

enum:

- DL

- UL

- SUL

IsInitialBwp:

type: string

enum:

- INITIAL

- OTHER

- SUL

IsESCoveredBy:

type: string

enum:

- NO

- PARTIAL

- FULL

RrmPolicyMember:

type: object

properties:

plmnId:

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

snssai:

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

RrmPolicyMemberList:

type: array

items:

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

AddressWithVlan:

type: object

properties:

ipv4Address:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Ipv4Addr'

ipv6Address:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Ipv6Addr'

vlanId:

type: integer

minimum: 0

maximum: 4096

LocalAddress:

type: object

properties:

addressWithVlan:

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

port:

type: integer

minimum: 0

maximum: 65535

RemoteAddress:

type: object

properties:

ipv4Address:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Ipv4Addr'

ipv6Address:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Ipv6Addr'

CellIndividualOffset:

type: object

properties:

rsrpOffsetSSB:

type: integer

rsrqOffsetSSB:

type: integer

sinrOffsetSSB:

type: integer

rsrpOffsetCSI-RS:

type: integer

rsrqOffsetCSI-RS:

type: integer

sinrOffsetCSI-RS:

type: integer

QOffsetRange:

type: integer

enum:

- -24

- -22

- -20

- -18

- -16

- -14

- -12

- -10

- -8

- -6

- -5

- -4

- -3

- -2

- -1

- 0

- 24

- 22

- 20

- 18

- 16

- 14

- 12

- 10

- 8

- 6

- 5

- 4

- 3

- 2

- 1

QOffsetRangeList:

type: object

properties:

rsrpOffsetSSB:

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

rsrqOffsetSSB:

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

sinrOffsetSSB:

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

rsrpOffsetCSI-RS:

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

rsrqOffsetCSI-RS:

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

sinrOffsetCSI-RS:

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

QOffsetFreq:

type: number

TReselectionNRSf:

type: integer

enum:

- 25

- 50

- 75

- 100

SsbPeriodicity:

type: integer

enum:

- 5

- 10

- 20

- 40

- 80

- 160

SsbDuration:

type: integer

enum:

- 1

- 2

- 3

- 4

- 5

SsbSubCarrierSpacing:

type: integer

enum:

- 15

- 30

- 120

- 240

CoverageShape:

type: integer

maximum: 65535

DigitalTilt:

type: integer

minimum: -900

maximum: 900

DigitalAzimuth:

type: integer

minimum: -1800

maximum: 1800

RSSetId:

type: integer

maximum: 4194303

RSSetType:

type: string

enum:

- RS1

- RS2

FrequencyDomainPara:

type: object

properties:

rimRSSubcarrierSpacing:

type: integer

rIMRSBandwidth:

type: integer

nrofGlobalRIMRSFrequencyCandidates:

type: integer

rimRSCommonCarrierReferencePoint:

type: integer

rimRSStartingFrequencyOffsetIdList:

type: array

items:

type: integer

SequenceDomainPara:

type: object

properties:

nrofRIMRSSequenceCandidatesofRS1:

type: integer

rimRSScrambleIdListofRS1:

type: array

items:

type: integer

nrofRIMRSSequenceCandidatesofRS2:

type: integer

rimRSScrambleIdListofRS2:

type: array

items:

type: integer

enableEnoughNotEnoughIndication:

type: string

enum:

- ENABLE

- DISABLE

RIMRSScrambleTimerMultiplier:

type: integer

RIMRSScrambleTimerOffset:

type: integer

TimeDomainPara:

type: object

properties:

dlULSwitchingPeriod1:

type: string

enum:

- MS0P5

- MS0P625

- MS1

- MS1P25

- MS2

- MS2P5

- MS3

- MS4

- MS5

- MS10

- MS20

symbolOffsetOfReferencePoint1:

type: integer

dlULSwitchingPeriod2:

type: string

enum:

- MS0P5

- MS0P625

- MS1

- MS1P25

- MS2

- MS2P5

- MS3

- MS4

- MS5

- MS10

- MS20

symbolOffsetOfReferencePoint2:

type: integer

totalnrofSetIdofRS1:

type: integer

totalnrofSetIdofRS2:

type: integer

nrofConsecutiveRIMRS1:

type: integer

nrofConsecutiveRIMRS2:

type: integer

consecutiveRIMRS1List:

type: array

items:

type: integer

consecutiveRIMRS2List:

type: array

items:

type: integer

enablenearfarIndicationRS1:

type: string

enum:

- ENABLE

- DISABLE

enablenearfarIndicationRS2:

type: string

enum:

- ENABLE

- DISABLE

RimRSReportInfo:

type: object

properties:

detectedSetID:

type: integer

propagationDelay:

type: integer

functionalityOfRIMRS:

type: string

enum:

- RS1

- RS2

- RS1forEnoughMitigation

- RS1forNotEnoughMitigation

RimRSReportConf:

type: object

properties:

reportIndicator:

type: string

enum:

- ENABLE

- DISABLE

reportInterval:

type: integer

nrofRIMRSReportInfo:

type: integer

maxPropagationDelay:

type: integer

rimRSReportInfoList:

type: array

items:

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

TceMappingInfo:

type: object

properties:

TceIPAddress:

oneOf:

- $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Ipv4Addr'

- $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Ipv6Addr'

TceID:

type: integer

PlmnTarget:

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

TceMappingInfoList:

type: array

items:

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

ResourceType:

type: string

enum:

- PRB

- PRB\_UL

- PRB\_DL

- RRC

- DRB

ParameterRange:

type: object

properties:

maxValue:

type: integer

minValue:

type: integer

#-------- Definition of abstract IOCs --------------------------------------------

RrmPolicy\_-Attr:

type: object

properties:

resourceType:

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

rRMPolicyMemberList:

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

#-------- Definition of concrete IOCs --------------------------------------------

MnS:

oneOf:

- type: object

properties:

SubNetwork:

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

- type: object

properties:

ManagedElement:

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

SubNetwork-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

$ref: 'TS28623\_GenericNrm.yaml#/components/schemas/SubNetwork-Attr'

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/SubNetwork-ncO'

- type: object

properties:

SubNetwork:

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

ManagedElement:

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

NRFrequency:

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

ExternalGnbCuCpFunction:

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

ExternalENBFunction:

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

EUtranFrequency:

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

DESManagementFunction:

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

DRACHOptimizationFunction:

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

DMROFunction:

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

DLBOFunction:

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

DPCIConfigurationFunction:

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

CPCIConfigurationFunction:

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

CESManagementFunction:

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

Configurable5QISet:

$ref: 'TS28541\_5GcNrm.yaml#/components/schemas/Configurable5QISet-Multiple'

RimRSGlobal:

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

Dynamic5QISet:

$ref: 'TS28541\_5GcNrm.yaml#/components/schemas/Dynamic5QISet-Multiple'

CCOFunction:

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

ManagedElement-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

$ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedElement-Attr'

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedElement-ncO'

- type: object

properties:

GnbDuFunction:

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

GnbCuUpFunction:

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

GnbCuCpFunction:

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

DESManagementFunction:

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

DRACHOptimizationFunction:

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

DMROFunction:

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

DLBOFunction:

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

DPCIConfigurationFunction:

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

CPCIConfigurationFunction:

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

CESManagementFunction:

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

Configurable5QISet:

$ref: 'TS28541\_5GcNrm.yaml#/components/schemas/Configurable5QISet-Multiple'

Dynamic5QISet:

$ref: 'TS28541\_5GcNrm.yaml#/components/schemas/Dynamic5QISet-Multiple'

GnbDuFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

gnbDuId:

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

gnbDuName:

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

gnbId:

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

gnbIdLength:

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

rimRSReportConf:

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

plmnInfoList:

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

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

- type: object

properties:

RRMPolicyRatio:

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

NrCellDu:

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

Bwp-Multiple:

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

NrSectorCarrier-Multiple:

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

EP\_F1C:

$ref: '#/components/schemas/EP\_F1C-Single'

EP\_F1U:

$ref: '#/components/schemas/EP\_F1U-Multiple'

DRACHOptimizationFunction:

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

OperatorDU:

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

OperatorDu-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

gnbId:

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

gnbIdLength:

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

plmnInfoList:

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

- type: object

properties:

EP\_F1C:

$ref: '#/components/schemas/EP\_F1C-Single'

EP\_F1U:

$ref: '#/components/schemas/EP\_F1U-Multiple'

GnbCuUpFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

gnbId:

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

gnbIdLength:

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

gnbCuUpId:

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

plmnInfoList:

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

configurable5QISetRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

dynamic5QISetRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

- type: object

properties:

RRMPolicyRatio:

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

EP\_E1:

$ref: '#/components/schemas/EP\_E1-Single'

EP\_XnU:

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

EP\_F1U:

$ref: '#/components/schemas/EP\_F1U-Multiple'

EP\_NgU:

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

EP\_X2U:

$ref: '#/components/schemas/EP\_X2U-Multiple'

EP\_S1U:

$ref: '#/components/schemas/EP\_S1U-Multiple'

GnbCuCpFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

gnbId:

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

gnbIdLength:

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

gnbCuName:

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

plmnId:

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

x2BlackList:

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

xnBlackList:

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

x2WhiteList:

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

xnWhiteList:

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

x2XnHOBlackList:

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

mappingSetIDBackhaulAddress:

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

tceMappingInfoList:

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

configurable5QISetRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

dynamic5QISetRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

dCHOControl:

type: boolean

dDAPSHOControl:

type: boolean

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

- type: object

properties:

RRMPolicyRatio:

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

NrCellCu:

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

EP\_XnC:

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

EP\_E1:

$ref: '#/components/schemas/EP\_E1-Multiple'

EP\_F1C:

$ref: '#/components/schemas/EP\_F1C-Multiple'

EP\_NgC:

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

EP\_X2C:

$ref: '#/components/schemas/EP\_X2C-Multiple'

DANRManagementFunction:

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

DESManagementFunction:

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

DMROFunction:

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

DLBOFunction:

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

NrCellCu-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

cellLocalId:

type: integer

plmnInfoList:

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

nRFrequencyRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

- type: object

properties:

RRMPolicyRatio:

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

NRCellRelation:

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

EUtranCellRelation:

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

NRFreqRelation:

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

EUtranFreqRelation:

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

DESManagementFunction:

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

DMROFunction:

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

DLBOFunction:

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

CESManagementFunction:

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

DPCIConfigurationFunction:

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

NrCellDu-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

administrativeState:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/AdministrativeState'

operationalState:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/OperationalState'

cellLocalId:

type: integer

cellState:

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

plmnInfoList:

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

npnIdentityList:

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

nrPci:

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

nrTac:

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

arfcnDL:

type: integer

arfcnUL:

type: integer

arfcnSUL:

type: integer

bSChannelBwDL:

type: integer

bSChannelBwUL:

type: integer

bSChannelBwSUL:

type: integer

ssbFrequency:

type: integer

minimum: 0

maximum: 3279165

ssbPeriodicity:

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

ssbSubCarrierSpacing:

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

ssbOffset:

type: integer

minimum: 0

maximum: 159

ssbDuration:

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

nrSectorCarrierRef:

type: array

items:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

bwpRef:

type: array

items:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

rimRSMonitoringStartTime:

type: string

rimRSMonitoringStopTime:

type: string

rimRSMonitoringWindowDuration:

type: integer

rimRSMonitoringWindowStartingOffset:

type: integer

rimRSMonitoringWindowPeriodicity:

type: integer

rimRSMonitoringOccasionInterval:

type: integer

rimRSMonitoringOccasionStartingOffset:

type: integer

nRFrequencyRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

victimSetRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

aggressorSetRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

- type: object

properties:

RRMPolicyRatio:

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

CPCIConfigurationFunction:

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

DRACHOptimizationFunction:

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

NrOperatorCellDu:

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

NrOperatorCellDu-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

cellLocalId:

type: integer

administrativeState:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/AdministrativeState'

plmnInfoList:

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

nrTac:

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

NRFrequency-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

absoluteFrequencySSB:

type: integer

minimum: 0

maximum: 3279165

ssbSubCarrierSpacing:

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

multiFrequencyBandListNR:

type: integer

minimum: 1

maximum: 256

EUtranFrequency-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

earfcnDL:

type: integer

minimum: 0

maximum: 262143

multiBandInfoListEutra:

type: integer

minimum: 1

maximum: 256

NrSectorCarrier-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

txDirection:

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

configuredMaxTxPower:

type: integer

arfcnDL:

type: integer

arfcnUL:

type: integer

bSChannelBwDL:

type: integer

bSChannelBwUL:

type: integer

sectorEquipmentFunctionRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

- type: object

properties:

CommonBeamformingFunction:

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

Bwp-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

bwpContext:

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

isInitialBwp:

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

subCarrierSpacing:

type: integer

cyclicPrefix:

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

startRB:

type: integer

numberOfRBs:

type: integer

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

CommonBeamformingFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- type: object

properties:

coverageShape:

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

digitalAzimuth:

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

digitalTilt:

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

- type: object

properties:

Beam:

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

Beam-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- type: object

properties:

beamIndex:

type: integer

beamType:

type: string

enum:

- SSB-BEAM

beamAzimuth:

type: integer

minimum: -1800

maximum: 1800

beamTilt:

type: integer

minimum: -900

maximum: 900

beamHorizWidth:

type: integer

minimum: 0

maximum: 3599

beamVertWidth:

type: integer

minimum: 0

maximum: 1800

RRMPolicyRatio-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: '#/components/schemas/RrmPolicy\_-Attr'

- type: object

properties:

rRMPolicyMaxRatio:

type: integer

rRMPolicyMinRatio:

type: integer

rRMPolicyDedicatedRatio:

type: integer

NRCellRelation-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

nRTCI:

type: integer

cellIndividualOffset:

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

adjacentNRCellRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

nRFreqRelationRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

isRemoveAllowed:

type: boolean

isHOAllowed:

type: boolean

isESCoveredBy:

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

isENDCAllowed:

type: boolean

isMLBAllowed:

type: boolean

EUtranCellRelation-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

adjacentEUtranCellRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

NRFreqRelation-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

offsetMO:

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

blockListEntry:

type: array

items:

type: integer

minimum: 0

maximum: 1007

blockListEntryIdleMode:

type: integer

cellReselectionPriority:

type: integer

cellReselectionSubPriority:

type: number

minimum: 0.2

maximum: 0.8

multipleOf: 0.2

pMax:

type: integer

minimum: -30

maximum: 33

qOffsetFreq:

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

qQualMin:

type: number

qRxLevMin:

type: integer

minimum: -140

maximum: -44

threshXHighP:

type: integer

minimum: 0

maximum: 62

threshXHighQ:

type: integer

minimum: 0

maximum: 31

threshXLowP:

type: integer

minimum: 0

maximum: 62

threshXLowQ:

type: integer

minimum: 0

maximum: 31

tReselectionNr:

type: integer

minimum: 0

maximum: 7

tReselectionNRSfHigh:

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

tReselectionNRSfMedium:

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

nRFrequencyRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

EUtranFreqRelation-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

cellIndividualOffset:

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

blackListEntry:

type: array

items:

type: integer

minimum: 0

maximum: 1007

blackListEntryIdleMode:

type: integer

cellReselectionPriority:

type: integer

cellReselectionSubPriority:

type: number

minimum: 0.2

maximum: 0.8

multipleOf: 0.2

pMax:

type: integer

minimum: -30

maximum: 33

qOffsetFreq:

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

qQualMin:

type: number

qRxLevMin:

type: integer

minimum: -140

maximum: -44

threshXHighP:

type: integer

minimum: 0

maximum: 62

threshXHighQ:

type: integer

minimum: 0

maximum: 31

threshXLowP:

type: integer

minimum: 0

maximum: 62

threshXLowQ:

type: integer

minimum: 0

maximum: 31

tReselectionEutran:

type: integer

minimum: 0

maximum: 7

tReselectionNRSfHigh:

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

tReselectionNRSfMedium:

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

eUTranFrequencyRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

DANRManagementFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

intrasystemANRManagementSwitch:

type: boolean

intersystemANRManagementSwitch:

type: boolean

DESManagementFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

desSwitch:

type: boolean

intraRatEsActivationOriginalCellLoadParameters:

$ref: "#/components/schemas/IntraRatEsActivationOriginalCellLoadParameters"

intraRatEsActivationCandidateCellsLoadParameters:

$ref: "#/components/schemas/IntraRatEsActivationCandidateCellsLoadParameters"

intraRatEsDeactivationCandidateCellsLoadParameters:

$ref: "#/components/schemas/IntraRatEsDeactivationCandidateCellsLoadParameters"

esNotAllowedTimePeriod:

$ref: "#/components/schemas/EsNotAllowedTimePeriod"

interRatEsActivationOriginalCellParameters:

$ref: "#/components/schemas/InterRatEsActivationOriginalCellParameters"

interRatEsActivationCandidateCellParameters:

$ref: "#/components/schemas/InterRatEsActivationCandidateCellParameters"

interRatEsDeactivationCandidateCellParameters:

$ref: "#/components/schemas/InterRatEsDeactivationCandidateCellParameters"

isProbingCapable:

type: string

enum:

- yes

- no

energySavingState:

type: string

enum:

- isNotEnergySaving

- isEnergySaving

DRACHOptimizationFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

drachOptimizationControl:

type: boolean

ueAccProbilityDist:

$ref: "#/components/schemas/UeAccProbilityDist"

ueAccDelayProbilityDist:

$ref: "#/components/schemas/UeAccDelayProbilityDist"

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

DMROFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

dmroControl:

type: boolean

maximumDeviationHoTriggerLow:

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

maximumDeviationHoTriggerHigh:

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

minimumTimeBetweenHoTriggerChange:

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

tstoreUEcntxt:

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

DLBOFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

dlboControl:

type: boolean

maximumDeviationHoTrigger:

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

minimumTimeBetweenHoTriggerChange:

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

DPCIConfigurationFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

dPciConfigurationControl:

type: boolean

nRPciList:

$ref: "#/components/schemas/NRPciList"

CPCIConfigurationFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

cPciConfigurationControl:

type: boolean

cSonPciList:

$ref: "#/components/schemas/CSonPciList"

CESManagementFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

cesSwitch:

type: boolean

intraRatEsActivationOriginalCellLoadParameters:

$ref: "#/components/schemas/IntraRatEsActivationOriginalCellLoadParameters"

intraRatEsActivationCandidateCellsLoadParameters:

$ref: "#/components/schemas/IntraRatEsActivationCandidateCellsLoadParameters"

intraRatEsDeactivationCandidateCellsLoadParameters:

$ref: "#/components/schemas/IntraRatEsDeactivationCandidateCellsLoadParameters"

esNotAllowedTimePeriod:

$ref: "#/components/schemas/EsNotAllowedTimePeriod"

interRatEsActivationOriginalCellParameters:

$ref: "#/components/schemas/IntraRatEsActivationOriginalCellLoadParameters"

interRatEsActivationCandidateCellParameters:

$ref: "#/components/schemas/IntraRatEsActivationOriginalCellLoadParameters"

interRatEsDeactivationCandidateCellParameters:

$ref: "#/components/schemas/IntraRatEsActivationOriginalCellLoadParameters"

energySavingControl:

type: string

enum:

- toBeEnergySaving

- toBeNotEnergySaving

energySavingState:

type: string

enum:

- isNotEnergySaving

- isEnergySaving

RimRSGlobal-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

frequencyDomainPara:

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

sequenceDomainPara:

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

timeDomainPara:

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

RimRSSet:

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

RimRSSet-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

setId:

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

setType:

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

nRCellDURefs:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnList'

ExternalGnbDuFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

gnbId:

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

gnbIdLength:

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

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

- type: object

properties:

EP\_F1C:

$ref: '#/components/schemas/EP\_F1C-Multiple'

EP\_F1U:

$ref: '#/components/schemas/EP\_F1U-Multiple'

ExternalGnbCuUpFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

gnbId:

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

gnbIdLength:

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

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

- type: object

properties:

EP\_E1:

$ref: '#/components/schemas/EP\_E1-Multiple'

EP\_F1U:

$ref: '#/components/schemas/EP\_F1U-Multiple'

EP\_XnU:

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

ExternalGnbCuCpFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: >-

TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr

- type: object

properties:

gnbId:

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

gnbIdLength:

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

plmnId:

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

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

- type: object

properties:

ExternalNrCellCu:

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

EP\_XnC:

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

EP\_E1:

$ref: '#/components/schemas/EP\_E1-Multiple'

EP\_F1C:

$ref: '#/components/schemas/EP\_F1C-Multiple'

ExternalNrCellCu-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

cellLocalId:

type: integer

nrPci:

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

plmnIdList:

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

nRFrequencyRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

ExternalENBFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

eNBId:

type: integer

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

- type: object

properties:

ExternalEUTranCell:

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

ExternalEUTranCell-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

- type: object

properties:

EUtranFrequencyRef:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

EP\_XnC-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/EP\_RP-Attr'

- type: object

properties:

localAddress:

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

remoteAddress:

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

EP\_E1-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/EP\_RP-Attr'

- type: object

properties:

localAddress:

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

remoteAddress:

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

EP\_F1C-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/EP\_RP-Attr'

- type: object

properties:

localAddress:

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

remoteAddress:

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

EP\_NgC-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/EP\_RP-Attr'

- type: object

properties:

localAddress:

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

remoteAddress:

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

EP\_X2C-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/EP\_RP-Attr'

- type: object

properties:

localAddress:

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

remoteAddress:

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

EP\_XnU-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/EP\_RP-Attr'

- type: object

properties:

localAddress:

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

remoteAddress:

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

EP\_F1U-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/EP\_RP-Attr'

- type: object

properties:

localAddress:

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

remoteAddress:

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

epTransportRefs:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnList'

EP\_NgU-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/EP\_RP-Attr'

- type: object

properties:

localAddress:

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

remoteAddress:

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

epTransportRefs:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnList'

EP\_X2U-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/EP\_RP-Attr'

- type: object

properties:

localAddress:

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

remoteAddress:

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

EP\_S1U-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/EP\_RP-Attr'

- type: object

properties:

localAddress:

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

remoteAddress:

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

CCOFunction-Single:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

cCOControl:

type: boolean

cCOWeakCoverageParameters:

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

cCOPilotPollutionParameters:

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

cCOOvershootCoverageParameters-Single:

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

CCOParameters-Attr:

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

attributes:

type: object

properties:

coverageShapeList:

type: integer

downlinkTransmitPowerRange:

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

antennaTiltRange:

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

antennaAzimuthRange:

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

digitalTiltRange:

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

digitalAzimuthRange:

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

CCOWeakCoverageParameters-Single:

allOf:

- $ref: '#/components/schemas/CCOParameters-Attr'

- type: object

CCOPilotPollutionParameters-Single:

allOf:

- $ref: '#/components/schemas/CCOParameters-Attr'

- type: object

CCOOvershootCoverageParameters-Single:

allOf:

- $ref: '#/components/schemas/CCOParameters-Attr'

- type: object

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

SubNetwork-Multiple:

type: array

items:

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

ManagedElement-Multiple:

type: array

items:

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

GnbDuFunction-Multiple:

type: array

items:

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

OperatorDu-Multiple:

type: array

items:

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

GnbCuUpFunction-Multiple:

type: array

items:

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

GnbCuCpFunction-Multiple:

type: array

items:

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

NrCellDu-Multiple:

type: array

items:

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

NrOperatorCellDu-Multiple:

type: array

items:

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

NrCellCu-Multiple:

type: array

items:

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

NRFrequency-Multiple:

type: array

minItems: 1

items:

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

EUtranFrequency-Multiple:

type: array

minItems: 1

items:

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

NrSectorCarrier-Multiple:

type: array

items:

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

Bwp-Multiple:

type: array

items:

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

Beam-Multiple:

type: array

items:

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

RRMPolicyRatio-Multiple:

type: array

items:

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

NRCellRelation-Multiple:

type: array

items:

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

EUtranCellRelation-Multiple:

type: array

items:

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

NRFreqRelation-Multiple:

type: array

items:

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

EUtranFreqRelation-Multiple:

type: array

items:

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

RimRSSet-Multiple:

type: array

items:

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

ExternalGnbDuFunction-Multiple:

type: array

items:

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

ExternalGnbCuUpFunction-Multiple:

type: array

items:

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

ExternalGnbCuCpFunction-Multiple:

type: array

items:

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

ExternalNrCellCu-Multiple:

type: array

items:

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

ExternalENBFunction-Multiple:

type: array

items:

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

ExternalEUTranCell-Multiple:

type: array

items:

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

EP\_E1-Multiple:

type: array

items:

$ref: '#/components/schemas/EP\_E1-Single'

EP\_XnC-Multiple:

type: array

items:

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

EP\_F1C-Multiple:

type: array

items:

$ref: '#/components/schemas/EP\_F1C-Single'

EP\_NgC-Multiple:

type: array

items:

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

EP\_X2C-Multiple:

type: array

items:

$ref: '#/components/schemas/EP\_X2C-Single'

EP\_XnU-Multiple:

type: array

items:

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

EP\_F1U-Multiple:

type: array

items:

$ref: '#/components/schemas/EP\_F1U-Single'

EP\_NgU-Multiple:

type: array

items:

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

EP\_X2U-Multiple:

type: array

items:

$ref: '#/components/schemas/EP\_X2U-Single'

EP\_S1U-Multiple:

type: array

items:

$ref: '#/components/schemas/EP\_S1U-Single'

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

resources-nrNrm:

oneOf:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- $ref: '#/components/schemas/EP\_E1-Single'

- $ref: '#/components/schemas/EP\_F1C-Single'

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

- $ref: '#/components/schemas/EP\_X2C-Single'

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

- $ref: '#/components/schemas/EP\_F1U-Single'

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

- $ref: '#/components/schemas/EP\_X2U-Single'

- $ref: '#/components/schemas/EP\_S1U-Single'

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

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

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

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

|  |
| --- |
| **Second Change** |

# E.5 Modules

## E.5.1 module \_3gpp-nr-nrm-beam.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-beam {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-nrnetwork-beam";

prefix "beam3gpp";

import \_3gpp-nr-nrm-commonbeamformingfunction { prefix cbeamff3gpp; }

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

import \_3gpp-nr-nrm-nrsectorcarrier { prefix nrsectcarr3gpp; }

organization "3GPP SA5";

description "Defines the YANG mapping of the Beam Information

Object Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-11-22 {

description "Initial revision";

reference "S5-197643";

}

typedef BeamType {

type enumeration {

enum SSB-BEAM;

}

}

grouping BeamGrp {

description "Represents the Beam IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

leaf beamIndex {

description "Index of the beam. ";

mandatory true;

type int32;

}

leaf beamType {

description "The type of the beam. ";

mandatory false;

type BeamType;

}

leaf beamAzimuth {

description "The azimuth of a beam transmission, which means the horizontal beamforming pointing angle (beam peak direction) in the (Phi) φ-axis in 1/10th degree resolution. The pointing angle is the direction equal to the geometric centre of the half-power contour of the beam relative to the reference plane. Zero degree implies explicit antenna bearing (boresight). Positive angle implies clockwise from the antenna bearing.";

reference "3GPP TS 38.104, TS 38.901, TS 28.662";

mandatory false;

type int32 { range "-1800..1800"; }

units "0.1";

}

leaf beamTilt {

description "The tilt of a beam transmission, which means the vertical beamforming pointing angle (beam peak direction) in the (Theta) θ-axis in 1/10th degree resolution.

The pointing angle is the direction equal to the geometric centre of the half-power contour of the beam relative to the reference plane. Positive value implies downtilt.";

reference "3GPP TS 38.104, TS 38.901, TS 28.662";

mandatory false;

type int32 { range "-900..900"; }

units "0.1";

}

leaf beamHorizWidth {

description " The Horizontal beamWidth of a beam transmission, which means the horizontal beamforming half-power (3dB down) beamwidth in the (Phi) φ-axis in 1/10th degree resolution.";

reference "3GPP TS 38.104, TS 38.901";

mandatory false;

type int32 { range "0..3599"; }

units "0.1";

}

leaf beamVertWidth {

description " The Vertical beamWidth of a beam transmission, which means the vertical beamforming half-power (3dB down) beamwidth in the (Theta) θ-axis in 1/10th degree resolution.";

reference "3GPP TS 38.104, TS 38.901";

mandatory false;

type int32 { range "0..1800"; }

units "0.1";

}

}

augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction/nrsectcarr3gpp:NRSectorCarrier/cbeamff3gpp:CommonBeamformingFunction" {

list Beam {

description "Represents the per-Beam information required for, e.g. beam performance management utilizing measurements generated in the RAN. Can have spatial attributes of horizontal/azimuth (ie: Phi φ-axis) and vertical/tilt (ie: Theta θ-axis) beam pointing direction and beam width attributes.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses BeamGrp;

}

}

}

}

<CODE ENDS>

## E.5.1a module \_3gpp-nr-nrm-bwp.yang

module \_3gpp-nr-nrm-bwp {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-bwp";

prefix "bwp3gpp";

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-common-managed-function { prefix mf3gpp; }

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

import \_3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the BWP Information Object Class

(IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2020-11-17 { reference CR-0410 ; }

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 { reference "Initial revision"; }

typedef CyclicPrefix {

type enumeration {

enum NORMAL;

enum EXTENDED;

}

}

typedef BwpContext {

type enumeration {

enum DL;

enum UL;

enum SUL;

}

}

typedef IsInitialBwp {

type enumeration {

enum INITIAL;

enum OTHER;

}

}

grouping BWPGrp {

description "Represents the BWP IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

leaf bwpContext {

description "Identifies whether the object is used for downlink, uplink

or supplementary uplink.";

mandatory true;

type BwpContext;

}

leaf isInitialBwp {

description "Identifies whether the object is used for initial or other

BWP.";

mandatory true;

type IsInitialBwp;

}

leaf subCarrierSpacing {

description "Subcarrier spacing configuration for a BWP.";

reference "3GPP TS 38.104";

mandatory true;

type uint32 { range "15 | 30 | 60 | 120"; }

units kHz;

}

leaf cyclicPrefix {

description "Cyclic prefix, which may be normal or extended.";

reference "3GPP TS 38.211";

mandatory true;

type CyclicPrefix;

}

leaf startRB {

description "Offset in common resource blocks to common resource block 0

for the applicable subcarrier spacing for a BWP.";

reference "N\_BWP\_start in 3GPP TS 38.211";

mandatory true;

type uint32;

}

leaf numberOfRBs {

description "Number of physical resource blocks for a BWP.";

reference "N\_BWP\_size in 3GPP TS 38.211";

mandatory true;

type uint32;

}

}

augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction" {

list BWP {

description "Represents a bandwidth part (BWP).";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses BWPGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

## E.5.1b module \_3gpp-nr-nrm-commonbeamformingfunction@2019-11-22.yang

module \_3gpp-nr-nrm-commonbeamformingfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-nrnetwork-commonbeamformingfunction";

prefix "combeamformfunc3gpp";

import \_3gpp-nr-nrm-nrsectorcarrier { prefix nrsectcarr3gpp; }

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

organization "3GPP SA5";

description "Defines the YANG mapping of the CommonBeamformingFuntion Information

Object Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-11-22 {

description "Initial revision";

reference "S5-197643";

}

grouping CommonBeamformingFunctionGrp {

description "Represents the CommonBeamformingFunction IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

leaf coverageShape {

description "Identifies the sector carrier coverage shape described by the envelope of the contained SSB beams. The coverage shape is implementation dependent.";

mandatory true;

type int32 { range "0..65535"; }

}

leaf digitalAzimuth {

description "Digitally-controlled azimuth through beamforming. It represents the horizontal pointing direction of the antenna relative to the antenna bore sight, representing the total non-mechanical horizontal pan of the selected coverageShape. Positive value gives azimuth to the right and negative value gives an azimuth to the left.";

reference "3GPP TS 38.104, TS 38.901, TS 28.662";

type int32 { range "-1800..1800"; }

units "0.1";

}

leaf digitalTilt {

description "Digitally-controlled tilt through beamforming. It represents the vertical pointing direction of the antenna relative to the antenna bore sight, representing the total non-mechanical vertical tilt of the selected coverageShape. Positive value gives downwards tilt and negative value gives upwards tilt.";

reference "3GPP TS 38.104, TS 38.901, TS 28.662";

type int32 { range "-900..900"; }

units "0.1";

}

}

augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction/nrsectcarr3gpp:NRSectorCarrier" {

list CommonBeamformingFunction {

description "Represents common beamforming functionality (eg: SSB beams) for the NRSectorCarrier.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses CommonBeamformingFunctionGrp;

}

}

}

}

## E.5.2 module \_3gpp-nr-nrm-ep.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-ep {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-ep";

prefix "ep3gpp";

import \_3gpp-common-ep-rp { prefix eprp3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

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

import \_3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }

import \_3gpp-nr-nrm-gnbcuupfunction { prefix gnbcuup3gpp; }

import \_3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the NR related endpoint

Information Object Classes (IOCs) that are part of the NR Network

Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2022-01-07 { reference CR-0643; }

revision 2021-05-01 { reference CR-0490; }

revision 2021-03-03 { reference CR-0435 ; }

revision 2021-02-17 { reference CR-0470; }

revision 2020-11-17 { reference CR-0410; }

revision 2020-03-02 { reference S5-201191; }

revision 2019-06-17 { reference "Initial revision"; }

feature EPClassesUnderGNBCUCPFunction {

description "Endpoint classes shall be contained under GNBCUCPFunction";

}

feature EPClassesUnderGNBCUUPFunction {

description "Endpoint classes shall be contained under GNBCUUPFunction";

}

feature EPClassesUnderGNBDUFunction {

description "Endpoint classes shall be contained under GNBDUFunction";

}

grouping EP\_E1Grp {

description "Represents the EP\_E1 IOC.";

reference "3GPP TS 28.541, 3GPP TS 38.401";

uses eprp3gpp:EP\_Common;

}

grouping EP\_F1CGrp {

description "Represents the EP\_F1C IOC.";

reference "3GPP TS 28.541, 3GPP TS 38.470";

uses eprp3gpp:EP\_Common;

}

grouping EP\_F1UGrp {

description "Represents the EP\_F1U IOC.";

reference "3GPP TS 28.541, 3GPP TS 38.470";

uses eprp3gpp:EP\_Common;

}

grouping EP\_XnCGrp {

description "Represents the EP\_XnC IOC.";

reference "3GPP TS 28.541, 3GPP TS 38.420";

uses eprp3gpp:EP\_Common;

}

grouping EP\_XnUGrp {

description "Represents the EP\_XnU IOC.";

reference "3GPP TS 28.541, 3GPP TS 38.420";

uses eprp3gpp:EP\_Common;

}

grouping EP\_NgCGrp {

description "Represents the EP\_NgC IOC.";

reference "3GPP TS 28.541, 3GPP TS 38.470";

uses eprp3gpp:EP\_Common;

}

grouping EP\_NgUGrp {

description "Represents the EP\_NgU IOC.";

reference "3GPP TS 28.541, 3GPP TS 38.470";

uses eprp3gpp:EP\_Common;

}

grouping EP\_X2CGrp {

description "Represents the EP\_X2C IOC.";

reference "3GPP TS 28.541, 3GPP TS 36.423";

uses eprp3gpp:EP\_Common;

}

grouping EP\_X2UGrp {

description "Represents the EP\_X2U IOC.";

reference "3GPP TS 28.541, 3GPP TS 36.425";

uses eprp3gpp:EP\_Common;

}

grouping EP\_S1UGrp {

description "Represents the EP\_S1U IOC.";

reference "3GPP TS 28.541, 3GPP TS 36.410";

uses eprp3gpp:EP\_Common;

}

augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction" {

if-feature EPClassesUnderGNBCUCPFunction;

list EP\_E1 {

description "Represents the local end point of the logical link,

supporting E1 interface between gNB-CU-CP and gNB-CU-UP.";

reference "3GPP TS 28.541, 3GPP TS 38.401";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_E1Grp;

}

}

list EP\_F1C {

description "Represents the local end point of the control plane

interface (F1-C) between the gNB-DU and gNB-CU or gNB-CU-CP.";

reference "3GPP TS 28.541, 3GPP TS 38.470";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_F1CGrp;

}

}

list EP\_NgC {

description "Represents the local end point of the control plane

interface (NG-C) between the gNB and AMF.";

reference "3GPP TS 28.541, 3GPP TS 38.470";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_NgCGrp;

}

}

list EP\_XnC {

description "Represents the local gNB node end point of the logical

link, supporting Xn application protocols, to a neighbour NG-RAN node

(including gNB and ng-eNB). The Xn Application PDUs are carried over

SCTP/IP/Data link layer/Physical layer stack.";

reference "3GPP TS 28.541, 3GPP TS 38.420 subclause 7";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_XnCGrp;

}

}

list EP\_X2C {

description "Represents the local end point of the logical link,

supporting X2-C application protocols used in EN-DC, to a neighbour

eNB or en-gNB node.";

reference "3GPP TS 28.541, 3GPP TS 36.423";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_X2CGrp;

}

}

}

augment "/me3gpp:ManagedElement/gnbcuup3gpp:GNBCUUPFunction" {

if-feature EPClassesUnderGNBCUUPFunction;

list EP\_E1 {

description "Represents the local end point of the logical link,

supporting E1 interface between gNB-CU-CP and gNB-CU-UP.";

reference "3GPP TS 28.541, 3GPP TS 38.401";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_E1Grp;

}

}

list EP\_F1U {

description "Represents the local end point of the user plane

interface (F1-U) between the gNB-DU and gNB-CU or gNB-CU-UP.";

reference "3GPP TS 28.541, 3GPP TS 38.470";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_F1UGrp;

}

}

list EP\_NgU {

description "Represents the local end point of the NG user plane

(NG-U) interface between the gNB and UPF.";

reference "3GPP TS 28.541, 3GPP TS 38.470";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_NgUGrp;

}

}

list EP\_XnU {

description "Represents the one end-point of a logical link supporting

the Xn user plane (Xn-U) interface. The Xn-U interface provides

non-guaranteed delivery of user plane PDUs between two NG-RAN nodes.";

reference "3GPP TS 28.541, 3GPP TS 38.420";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_XnUGrp;

}

}

list EP\_X2U {

description "Represents the local end-point of a logical link supporting

the X2 user plane (X2-U) interface used in EN-DC.";

reference "3GPP TS 28.541, 3GPP TS 36.425";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_X2UGrp;

}

}

list EP\_S1U {

description "Represents the local end point of the logical link,

supporting S1-U interface towards a S-GW node.";

reference "3GPP TS 28.541, 3GPP TS 36.410";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_S1UGrp;

}

}

}

augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction" {

if-feature EPClassesUnderGNBDUFunction;

list EP\_F1C {

description "Represents the local end point of the control plane

interface (F1-C) between the DU and CU or CU-CP.";

reference "3GPP TS 28.541, 3GPP TS 38.470";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_F1CGrp;

}

}

list EP\_F1U {

description "Represents the local end point of the user plane

interface (F1-U) between the DU and CU or CU-UP.";

reference "3GPP TS 28.541, 3GPP TS 38.470";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EP\_F1UGrp;

}

}

}

}

<CODE ENDS>

## E.5.3 module \_3gpp-nr-nrm-eutrancellrelation@2019-10-28.yang

module \_3gpp-nr-nrm-eutrancellrelation {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-eutrancellrelation";

prefix "eutrancellrel3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }

import \_3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

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

organization "3GPP SA5";

description "Defines the YANG mapping of the EUtranCellRelation Information

Object Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

typedef ActionAllowed {

type enumeration {

enum YES;

enum NO;

}

}

typedef EnergySavingCoverage {

type enumeration {

enum YES;

enum NO;

enum PARTIAL;

}

}

grouping EUtranCellRelationGrp {

description "Represents the EUtranCellRelation IOC.";

reference "3GPP TS 28.541, EUtranRelation in 3GPP TS 28.658";

uses mf3gpp:ManagedFunctionGrp;

leaf tCI {

description "Target Cell Identifier. Consists of E-UTRAN Cell Global

Identifier (ECGI) and Physical Cell Identifier (PCI) of the target

cell. Identifies the target cell from the perspective of the parent

cell instance.";

mandatory true;

type uint64;

}

leaf isRemoveAllowed {

description "Indicates if the subject EUtranCellRelation can be removed

(deleted) or not. If YES, the subject EUtranCellRelation instance can

be removed (deleted). If NO, the subject EUtranCellRelation instance

shall not be removed (deleted) by any entity but an IRPManager.";

mandatory true;

type ActionAllowed;

}

leaf isHOAllowed {

description "Indicates if handover is allowed or prohibited. If YES,

handover is allowed from source cell to target cell. Source cell is

represented by the parent cell instance. Target cell is the adjacent

cell referenced by this EUtranCellRelation instance. If NO, handover

shall not be allowed.";

mandatory true;

type ActionAllowed;

}

leaf isENDCAllowed {

description "Indicates if EN-DC is allowed or prohibited. If TRUE,

the target cell is allowed to be used for EN-DC. The target cell is

referenced by the NRCellRelation that contains this isENDCAllowed.

If FALSE, EN-DC shall not be allowed.";

mandatory true;

type ActionAllowed;

}

leaf isICICInformationSendAllowed {

description "Indicates if ICIC (Inter Cell Interference Coordination)

load information message sending is allowed or prohibited. If YES,

ICIC load information message sending is allowed from source cell to

target cell. Source cell is represented by the parent cell instance.

Target cell is the adjacent cell referenced by this EUtranCellRelation

instance. If NO, ICIC load information message sending shall not be

allowed.";

reference "3GPP TS 36.423";

mandatory true;

type ActionAllowed;

}

leaf isLBAllowed {

description "Indicates if load balancing is allowed or prohibited from

source cell to target cell. If YES, load balancing is allowed from

source cell to target cell. Source cell is represented by the parent

cell instance. Target cell is the adjacent cell referenced by this

EUtranCellRelation instance. If NO, load balancing shall be prohibited

from source cell to target cell.";

mandatory true;

type ActionAllowed;

}

leaf isESCoveredBy {

description "Indicates whether the adjacent cell according to this

planning provides no, partial or full coverage for the parent cell

instance. Adjacent cells with this attribute equal to YES are

recommended to be considered as candidate cells to take over the

coverage when the original cell is about to be transferred to energy

saving state. The entirety of adjacent cells with this property equal

to PARTIAL are recommended to be considered as entirety of candidate

cells to take over the coverage when the original cell is about to be

transferred to energy saving state.";

mandatory true;

type EnergySavingCoverage;

}

leaf qOffset {

description "Offset applicable to a specific neighbouring cell used for

evaluating the cell as a candidate for cell re-selection. Corresponds

to parameter q-OffsetCell broadcast in SIB4 for intra-frequency cells

and in SIB5 for inter-frequency cells. Used for Mobility Robustness

Optimization.";

reference "3GPP TS 36.331";

mandatory true;

type types3gpp:QOffsetRange;

}

leaf cellIndividualOffset {

description "Offset applicable to a neighbouring cell. It is used for

evaluating the neighbouring cell for handover in connected mode. Used

by the HandOver parameter Optimization (HOO) function or Load

Balancing Optimization (LBO) function.";

reference "3GPP TS 36.331";

config false;

type types3gpp:QOffsetRange;

}

leaf adjacentCell {

description "Reference to an EUtranCellFDD/TDD or

ExternalEUtranCellFDD/TDD instance.";

mandatory true;

type types3gpp:DistinguishedName;

}

}

augment /me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/nrcellcu3gpp:NRCellCU {

list EUtranCellRelation {

description "Represents a relation between an NR cell and an E-UTRAN cell.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EUtranCellRelationGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

## E.5.4 module \_3gpp-nr-nrm-eutranetwork@2019-06-17.yang

module \_3gpp-nr-nrm-eutranetwork {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-eutranetwork";

prefix "eutranet3gpp";

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

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

organization "3GPP SA5";

description "Defines the YANG mapping of the EUtraNetwork Information Object

Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-06-17 {

description "Initial revision";

}

feature ExternalsUnderEUtraNetwork {

description "Classes representing external entities like EUtranFrequency,

ExternalENBFunction are contained under a EUtraNetwork list/class.";

}

grouping EUtraNetworkGrp {

description "Represents the EUtraNetwork IOC.";

reference "3GPP TS 28.541";

uses subnet3gpp:SubNetworkGrp;

}

list EUtraNetwork {

description "A subnetwork containing gNB external E-UTRAN entities.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EUtraNetworkGrp;

leaf-list parents {

description "Reference to all containg EUtraNetwork instances

in strict order from the root EUtraNetwork down to the immediate

parent EUtraNetwork.

If EUtraNetworks form a containment hierarchy this is

modeled using references between the child EUtraNetwork and the parent

EUtraNetworks.

This reference MUST NOT be present for the top level EUtraNetwork and

MUST be present for other EUtraNetworks.";

type leafref {

path "../../../EUtraNetwork/id";

}

}

leaf-list containedChildren{

description "Reference to all directly contained EUtraNetwork instances.

If EUtraNetworks form a containment hierarchy this is

modeled using references between the child EUtraNetwork and the parent

EUtraNetwork.";

type leafref {

path "../../../EUtraNetwork/id";

}

}

}

}

}

## E.5.5 module \_3gpp-nr-nrm-eutranfreqrelation@2019-10-28.yang

module \_3gpp-nr-nrm-eutranfreqrelation {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-eutranfreqrelation";

prefix "eutranfreqrel3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

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

import \_3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }

import \_3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

organization "3GPP SA5";

description "Defines the YANG mapping of the EUtranFreqRelation Information

Object Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping EUtranFreqRelationGrp {

description "Represents the EUtranFreqRelation IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

leaf cellIndividualOffset {

description "Offset applicable to a neighbouring cell. Used for

evaluating the neighbouring cell for handover in connected mode.

Used by the HandOver parameter Optimization (HOO) function or

Load Balancing Optimization (LBO) function.";

reference "cellIndividualOffset in MeasObjectEUTRA in 3GPP TS 38.331";

default 0;

type types3gpp:QOffsetRange;

}

leaf-list blackListEntry {

description "A list of Physical Cell Identities (PCIs) that are

blacklisted in E-UTRAN measurements.";

reference "3GPP TS 38.331";

min-elements 0;

type uint16 { range "0..1007"; }

}

leaf-list blackListEntryIdleMode {

description "A list of Physical Cell Identities (PCIs) that are

blacklisted in SIB4 and SIB5.";

min-elements 0;

type uint16 { range "0..1007"; }

}

leaf cellReselectionPriority {

description "The absolute priority of the carrier frequency used by the

cell reselection procedure. Value 0 means lowest priority. The value

must not already used by other RAT, i.e. equal priorities between RATs

are not supported. The UE behaviour when no value is entered is

specified in subclause 5.2.4.1 of 3GPP TS 38.304.";

reference "CellReselectionPriority in 3GPP TS 38.331, priority in

3GPP TS 38.304";

mandatory true;

type int32 { range "0..7"; }

}

leaf cellReselectionSubPriority {

description "Indicates a fractional value to be added to the value of

cellReselectionPriority to obtain the absolute priority of the

concerned carrier frequency for E-UTRA and NR.";

reference "3GPP TS 38.331";

type uint8 { range "2 | 4 | 6 | 8"; }

units "0.1";

}

leaf pMax {

description "Used for calculation of the parameter Pcompensation

(defined in 3GPP TS 38.304), at cell reselection to a cell.";

reference "PEMAX in 3GPP TS 38.101-1";

mandatory true;

type int32 { range "-30..33"; }

units dBm;

}

leaf qOffsetFreq {

description "The frequency specific offset applied when evaluating

candidates for cell reselection.";

type int32;

default 0;

}

leaf qQualMin {

description "Indicates the minimum required quality level in the cell.

Value 0 means that it is not sent and UE applies in such case the

(default) value of negative infinity for Qqualmin. Sent in SIB3 or

SIB5.";

reference "qQualMin in TS 38.304";

mandatory true;

type int32 { range "-34..-3 | 0"; }

units dB;

}

leaf qRxLevMin {

description "Indicates the required minimum received Reference Symbol

Received Power (RSRP) level in the (E-UTRA) frequency for cell

reselection. Broadcast in SIB3 or SIB5, depending on whether the

related frequency is intra- or inter-frequency. Resolution is 2.";

reference "Qrxlevmin in 3GPP TS 38.304";

mandatory true;

type int32 { range "-140..-44"; }

units dBm;

}

leaf threshXHighP {

description "Specifies the Srxlev threshold used by the UE when

reselecting towards a higher priority RAT/frequency than the current

serving frequency. Each frequency of NR and E-UTRAN might have a

specific threshold. Resolution is 2.";

reference "ThreshX, HighP in 3GPP TS 38.304";

mandatory true;

type int32 { range "0..62"; }

units dB;

}

leaf threshXHighQ {

description "Specifies the Squal threshold used by the UE when

reselecting towards a higher priority RAT/frequency than the current

serving frequency. Each frequency of NR and E-UTRAN might have a

specific threshold.";

reference "ThreshX, HighQ in 3GPP TS 38.304";

mandatory true;

type int32 { range 0..31; }

units dB;

}

leaf threshXLowP {

description "Specifies the Srxlev threshold used by the UE when

reselecting towards a lower priority RAT/frequency than the current

serving frequency. Each frequency of NR and E-UTRAN might have a

specific threshold. Resolution is 2.";

reference "ThreshX, LowP in 3GPP TS 38.304";

mandatory true;

type int32 { range "0..62"; }

units dB;

}

leaf threshXLowQ {

description "Specifies the Squal threshold used by the UE when

reselecting towards a lower priority RAT/frequency than the current

serving frequency. Each frequency of NR and E-UTRAN might have a

specific threshold.";

reference "ThreshX, LowQ in 3GPP TS 38.304";

mandatory false;

type int32 { range "0..31"; }

units dB;

}

leaf tReselectionEutra {

description "Cell reselection timer for intra frequency E-UTRA cell

reselection. May be used for Mobility Robustness Optimization.";

reference "t-ReselectionEUTRA in 3GPP TS 36.331 and in 3GPP TS 23.207";

mandatory true;

type uint8 { range "0..7"; }

units s;

}

leaf tReselectionEutraSfHigh {

description "The attribute tReselectionEutra (parameter TreselectionEUTRA

in 3GPP TS 38.304) multiplied with this scaling factor if the UE is in

high mobility state.";

reference "Speed dependent ScalingFactor for TreselectionEUTRA for high

mobility state in 3GPP TS 38.304";

mandatory true;

type uint8 { range "25 | 50 | 75 | 100"; }

units %;

}

leaf tReselectionEutraSfMedium {

description "The attribute tReselectionEutra (parameter TreselectionEUTRA

in 3GPP TS 38.304) multiplied with this scaling factor if the UE is in

medium mobility state.";

reference "Speed dependent ScalingFactor for TreselectionEUTRA for medium

mobility state in 3GPP TS 38.304";

mandatory true;

type uint8 { range "25 | 50 | 75 | 100"; }

units %;

}

leaf eUtranFrequencyRef {

description "Reference to a corresponding EUtranFrequency instance.";

mandatory true;

type types3gpp:DistinguishedName;

}

}

augment /me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/nrcellcu3gpp:NRCellCU {

list EUtranFreqRelation {

description "Represents a frequency relation between an NR cell and an

E-UTRAN cell.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EUtranFreqRelationGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

## E.5.6 module \_3gpp-nr-nrm-eutranfrequency@2019-10-28.yang

module \_3gpp-nr-nrm-eutranfrequency {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-eutranfrequency";

prefix "eutraneteutranfreq3gpp";

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-nr-nrm-eutranetwork { prefix eutranet3gpp; }

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

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

organization "3GPP SA5";

description "Defines the YANG mapping of the EUtranFrequency Information

Object Class (IOC), that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM),

3GPP TS 28.658 (E-UTRAN) Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping EUtranFrequencyGrp {

description "Represents the EUtranFrequency IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

leaf earfcnDL {

description "Specifies the channel number for the central DL frequency.";

reference "3GPP TS 36.101";

mandatory true;

type uint32 { range "0..262143"; }

}

leaf-list multiBandInfoListEutra {

description "List of additional frequency bands the frequency belongs to.";

config false;

min-elements 0;

type uint16 { range "1..256"; }

}

}

grouping EUtranFrequencyWrapper {

list EUtranFrequency {

description "Represents certain E-UTRAN frequency properties.";

reference "3GPP TS 28.658";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses EUtranFrequencyGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

augment "/subnet3gpp:SubNetwork" {

if-feature subnet3gpp:ExternalsUnderSubNetwork ;

uses EUtranFrequencyWrapper ;

}

augment "/eutranet3gpp:EUtraNetwork" {

if-feature eutranet3gpp:ExternalsUnderEUtraNetwork;

uses EUtranFrequencyWrapper ;

}

}

## E.5.7 module \_3gpp-nr-nrm-externalamffunction@2019-10-28.yang

module \_3gpp-nr-nrm-externalamffunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-externalamffunction";

prefix "extamf3gpp";

import \_3gpp-common-managed-function { prefix mf3gpp; }

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

import \_3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }

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

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

organization "3GPP SA5";

description "Defines the YANG mapping of the ExternalAMFFunction Information

Object Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping ExternalAMFFunctionGrp {

description "Represents the ExternalAMFFunction IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

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";

uses types3gpp:PLMNId;

}

container aMFIdentifier {

presence true;

description "An AMF identifier, comprising an AMF Region ID, an AMF Set ID and an AMF Pointer.";

uses types3gpp:AmfIdentifier;

}

}

grouping ExternalAMFFunctionWrapper {

list ExternalAMFFunction {

description "Represents the properties, known by the management

function, of a AMFFunction managed by another management

function.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses ExternalAMFFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

augment "/subnet3gpp:SubNetwork" {

if-feature subnet3gpp:ExternalsUnderSubNetwork ;

uses ExternalAMFFunctionWrapper;

}

augment "/nrnet3gpp:NRNetwork" {

if-feature nrnet3gpp:ExternalsUnderNRNetwork;

uses ExternalAMFFunctionWrapper;

}

}

## E.5.8 module \_3gpp-nr-nrm-externalenbfunction@2019-10-28.yang

module \_3gpp-nr-nrm-externalenbfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-externalenbfunction";

prefix "extenb3gpp";

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-nr-nrm-eutranetwork { prefix eutranet3gpp; }

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

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

organization "3GPP SA5";

description "Defines the YANG mapping of the ExternalENBFunction

Information Object Class (IOC) that is part of the NR Network Resource

Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM),

3GPP TS 28.658 (E-UTRAN) Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping ExternalENBFunctionGrp {

description "Represets the ExternalENBFunction IOC.";

reference "3GPP TS 28.658";

uses mf3gpp:ManagedFunctionGrp;

leaf eNBId {

description "Unambiguously identifies an eNodeB within a PLMN.";

reference "3GPP TS 36.413, 3GPP TS 36.300";

mandatory true;

type int32 { range "0..268435455"; } // Representing 28 bit eNB ID.

// 18, 20 and 21 bit eNB IDs also

// allowed.

}

}

grouping ExternalENBFunctionWrapper {

list ExternalENBFunction {

description "Represents an external eNB functionality.";

reference "3GPP TS 28.658";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses ExternalENBFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

augment "/subnet3gpp:SubNetwork" {

if-feature subnet3gpp:ExternalsUnderSubNetwork ;

uses ExternalENBFunctionWrapper;

}

augment "/eutranet3gpp:EUtraNetwork" {

if-feature eutranet3gpp:ExternalsUnderEUtraNetwork;

uses ExternalENBFunctionWrapper;

}

}

## E.5.9 module \_3gpp-nr-nrm-externaleutrancell@2019-10-28.yang

module \_3gpp-nr-nrm-externaleutrancell {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-externaleutrancell";

prefix "exteutrancell3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

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

import \_3gpp-nr-nrm-eutranetwork { prefix eutranet3gpp; }

import \_3gpp-nr-nrm-externalenbfunction { prefix extenb3gpp; }

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

organization "3GPP SA5";

description "Defines the YANG mapping of the ExternalEUtranCellFDD and

ExternalEUtranCellTDD Information Object Classes (IOCs) that are part

of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM),

3GPP TS 28.658 (E-UTRAN) Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping ExternalEUtranGenericCellGrp {

description "Represents the ExternalEUtranGenericCell IOC.";

reference "3GPP TS 28.658";

uses mf3gpp:ManagedFunctionGrp;

leaf pci {

description "The Physical Cell Identity (PCI) of the cell (for

NM-Centralized, EM-Centralized and Distributed PCI assignment cases).

In the case of NM-Centralized PCI assignment, see 3GPP TS 36.300.";

reference "3GPP TS 36.211";

mandatory true;

type int32 { range "0..503"; }

}

list plmnIdList {

description "List of unique identities for PLMNs. A cell can broadcast

up to 6 PLMN IDs. This is to support the case that one cell can be

used by up to 6 operator's core networks. The PLMN(s) included in this

list will use the same single tracking area code (TAC) and the same

Cell Identity (cellLocalId) for sharing the radio access network

resources. One member of plmnIdList is the primary PLMN ID. A PLMN ID

included in this list cannot be included in the cellAccessInfoList.

The PLMN ID is composed of a Mobile Country Code (MCC) and a Mobile

Network Code (MNC).";

reference "3GPP TS 36.300, 3GPP TS 36.331, 3GPP TS 23.003";

key "mcc mnc";

min-elements 1;

max-elements 6;

uses types3gpp:PLMNId;

}

leaf cellLocalId {

description "Unambiguously identifies a cell within an eNodeB.";

reference "NCI defined in 3GPP TS 38.300";

type int32 {range "0..255"; }

}

leaf eNBId {

description "Unambiguously identifies an eNodeB within a PLMN.";

reference "3GPP TS 36.413, 3GPP TS 36.300";

mandatory true;

type int32 { range "0..268435455"; } // Representing 28 bit eNB ID.

// 18, 20 and 21 bit eNB IDs also

// allowed.

}

}

grouping ExternalEUtranCellFDDGrp {

description "Represents the ExternalEUtranCellFDD IOC.";

reference "3GPP TS 28.658";

uses ExternalEUtranGenericCellGrp;

leaf earfcnDL {

description "The channel number for the central DL frequency.";

reference "3GPP TS 36.101";

mandatory true;

type int32 { range "0..17999 | 46590..262143"; }

}

leaf earfcnUL {

description "The channel number for the central UL frequency. Value 0

means that the UL channel number is N/A for the DL-only bands.";

reference "3GPP TS 36.101";

mandatory true;

type int32 { range "0 | 18000..35999 | 46590..262143"; }

}

}

grouping ExternalEUtranCellTDDGrp {

description "Represents the ExternalEUtranCellTDD IOC.";

reference "3GPP TS 28.658";

uses ExternalEUtranGenericCellGrp;

leaf earfcn {

description "The frequency number for the central frequency.";

reference "3GPP TS 36.104";

mandatory true;

type int32 { range "36000..262143"; }

}

}

grouping ExternalEUtranCellFDDWrapper {

list ExternalEUtranCellFDD {

description "Represents the common properties of external E-UTRAN FDD

cell provided by eNB or NG-RAN FDD cell provided by ng-eNB.";

reference "3GPP TS 28.658";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses ExternalEUtranCellFDDGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

grouping ExternalEUtranCellTDDWrapper {

list ExternalEUtranCellTDD {

description "Represents the common properties of external E-UTRAN cell

TDD provided by eNB or NG-RAN TDD cell provided by ng-eNB.";

reference "3GPP TS 28.658";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses ExternalEUtranCellTDDGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

augment "/subnet3gpp:SubNetwork/extenb3gpp:ExternalENBFunction" {

if-feature subnet3gpp:ExternalsUnderSubNetwork;

uses ExternalEUtranCellFDDWrapper;

}

augment "/eutranet3gpp:EUtraNetwork/extenb3gpp:ExternalENBFunction" {

if-feature eutranet3gpp:ExternalsUnderEUtraNetwork;

uses ExternalEUtranCellFDDWrapper;

}

augment "/subnet3gpp:SubNetwork/extenb3gpp:ExternalENBFunction" {

if-feature subnet3gpp:ExternalsUnderSubNetwork;

uses ExternalEUtranCellTDDWrapper;

}

augment "/eutranet3gpp:EUtraNetwork/extenb3gpp:ExternalENBFunction" {

if-feature eutranet3gpp:ExternalsUnderEUtraNetwork;

uses ExternalEUtranCellTDDWrapper;

}

}

## E.5.10 module \_3gpp-nr-nrm-externalgnbcucpfunction@2019-10-28.yang

module \_3gpp-nr-nrm-externalgnbcucpfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-externalgnbcucpfunction";

prefix "extgnbcucp3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }

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

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

organization "3GPP SA5";

description "Defines the YANG mapping of the ExternalGNBCUCPFunction

Information Object Class (IOC), that is part of the NR Network Resource

Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping ExternalGNBCUCPFunctionGrp {

description "Represets the ExternalGNBCUCPFunction IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

leaf gNBId {

description "Identifies a gNB within a PLMN.";

reference "gNB Identifier (gNB ID) in 3GPP TS 38.300, Global gNB ID

in 3GPP TS 38.413";

mandatory true;

type int64 { range "0..4294967295"; }

}

leaf gNBIdLength {

description "Indicates the number of bits for encoding the gNB ID.";

reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";

mandatory true;

type int32 { range "22..32"; }

}

list pLMNId {

description "Specifies the PLMN identifier to be used as part of the

global RAN node identity.";

key "mcc mnc";

min-elements 1;

max-elements 1;

uses types3gpp:PLMNId;

}

}

grouping ExternalGNBCUCPFunctionWrapper {

list ExternalGNBCUCPFunction {

description "Represents the properties, known by the management function,

of a GNBCUCPFunction managed by another management function.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses ExternalGNBCUCPFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

augment "/subnet3gpp:SubNetwork" {

if-feature subnet3gpp:ExternalsUnderSubNetwork ;

uses ExternalGNBCUCPFunctionWrapper;

}

augment "/nrnet3gpp:NRNetwork" {

if-feature nrnet3gpp:ExternalsUnderNRNetwork;

uses ExternalGNBCUCPFunctionWrapper;

}

}

## E.5.11 module \_3gpp-nr-nrm-externalgnbcuupfunction@2019-10-28.yang

module \_3gpp-nr-nrm-externalgnbcuupfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-externalgnbcuupfunction";

prefix "extgnbcuup3gpp";

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }

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

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

organization "3GPP SA5";

description "Defines the YANG mapping of the ExternalGNBCUUPFunction

Information Object Class (IOC), that is part of the NR Network

Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping ExternalGNBCUUPFunctionGrp {

description "Represets the ExternalGNBCUUPFunction IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

leaf gNBId {

description "Identifies a gNB within a PLMN.";

reference "gNB Identifier (gNB ID) in 3GPP TS 38.300, Global gNB ID

in 3GPP TS 38.413";

mandatory true;

type int64 { range "0..4294967295"; }

}

leaf gNBIdLength {

description "Indicates the number of bits for encoding the gNB ID.";

reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";

mandatory true;

type int32 { range "22..32"; }

}

}

grouping ExternalGNBCUUPFunctionWrapper {

list ExternalGNBCUUPFunction {

description "Represents the properties, known by the management function,

of a GNBCUUPFunction managed by another management function.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses ExternalGNBCUUPFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

augment "/subnet3gpp:SubNetwork" {

if-feature subnet3gpp:ExternalsUnderSubNetwork ;

uses ExternalGNBCUUPFunctionWrapper;

}

augment "/nrnet3gpp:NRNetwork" {

if-feature nrnet3gpp:ExternalsUnderNRNetwork;

uses ExternalGNBCUUPFunctionWrapper;

}

}

## E.5.12 module \_3gpp-nr-nrm-externalgnbdufunction@2019-10-28.yang

module \_3gpp-nr-nrm-externalgnbdufunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-externalgnbdufunction";

prefix "extgnbdu3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }

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

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

organization "3GPP SA5";

description "Defines the YANG mapping of the ExternalGNBDUFunction

Information Object Class (IOC) that is part of the NR Network Resource

Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping ExternalGNBDUFunctionGrp {

description "Represets the ExternalGNBDUFunction IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

leaf gNBId {

description "Identifies a gNB within a PLMN.";

reference "gNB Identifier (gNB ID) in 3GPP TS 38.300, Global gNB ID

in 3GPP TS 38.413";

mandatory true;

type int64 { range "0..4294967295"; }

}

leaf gNBIdLength {

description "Indicates the number of bits for encoding the gNB ID.";

reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";

mandatory true;

type int32 { range "22..32"; }

}

list pLMNId {

description "Specifies the PLMN identifier to be used as part of the

global RAN node identity.";

key "mcc mnc";

min-elements 1;

max-elements 1;

uses types3gpp:PLMNId;

}

}

grouping ExternalGNBDUFunctionWrapper {

list ExternalGNBDUFunction {

description "Represents the properties, known by the management function,

of a GNBDUFunction managed by another management function.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses ExternalGNBDUFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

augment "/subnet3gpp:SubNetwork" {

if-feature subnet3gpp:ExternalsUnderSubNetwork ;

uses ExternalGNBDUFunctionWrapper;

}

augment "/nrnet3gpp:NRNetwork" {

if-feature nrnet3gpp:ExternalsUnderNRNetwork;

uses ExternalGNBDUFunctionWrapper;

}

}

## E.5.13 module \_3gpp-nr-nrm-externalnrcellcu@2019-10-28.yang

module \_3gpp-nr-nrm-externalnrcellcu {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-externalnrcellcu";

prefix "extnrcellcu3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }

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

import \_3gpp-nr-nrm-externalgnbcucpfunction { prefix extgnbcucp3gpp; }

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

organization "3GPP SA5";

description "Defines the YANG mapping of the ExternalNRCellCU Information

Object Class (IOC), that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping ExternalNRCellCUGrp {

description "Represents the ExternalNRCellCU IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

leaf cellLocalId {

description "Identifies an NR cell of a gNB. Together with corresponding

gNB ID it forms the NR Cell Identifier (NCI).";

reference "NCI in 3GPP TS 38.300";

mandatory true;

type int32 {range "0..16383"; }

}

leaf nRPCI {

description "The Physical Cell Identity (PCI) of the NR cell.";

reference "3GPP TS 36.211";

mandatory true;

type int32 { range "0..1007"; }

}

list pLMNIdList {

description "Defines which PLMNs that are assumed to be served by the

NR cell in another gNB CU-CP. This list is either updated by the

managed element itself (e.g. due to ANR, signalling over Xn, etc.) or

by consumer over the standard interface.";

key "mcc mnc";

min-elements 1;

max-elements 12;

uses types3gpp:PLMNId;

}

leaf nRFrequencyRef {

description "Reference to corresponding NRFrequency instance.";

mandatory true;

type types3gpp:DistinguishedName;

}

}

grouping ExternalNRCellCUWrapper {

list ExternalNRCellCU {

description "Represents the properties of an NRCellCU controlled by

another Management Service Provider.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses ExternalNRCellCUGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

augment "/subnet3gpp:SubNetwork/extgnbcucp3gpp:ExternalGNBCUCPFunction" {

if-feature subnet3gpp:ExternalsUnderSubNetwork ;

uses ExternalNRCellCUWrapper;

}

augment "/nrnet3gpp:NRNetwork/extgnbcucp3gpp:ExternalGNBCUCPFunction" {

if-feature nrnet3gpp:ExternalsUnderNRNetwork;

uses ExternalNRCellCUWrapper;

}

}

## E.5.14 module \_3gpp-nr-nrm-externalservinggwfunction@2019-10-28.yang

module \_3gpp-nr-nrm-externalservinggwfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-externalservinggwfunction";

prefix "extservgw3gpp";

import \_3gpp-common-managed-function { prefix mf3gpp; }

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

import \_3gpp-nr-nrm-eutranetwork { prefix eutranet3gpp; }

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

organization "3GPP SA5";

description "Defines the YANG mapping of the ExternalServingGWFunction

Information Object Class (IOC) that is part of the NR Network Resource

Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping ExternalServingGWFunctionGrp {

description "Represents the ExternalServingGWFunction IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

}

grouping ExternalServingGWFunctionWrapper {

list ExternalServingGWFunction {

description "Represents the properties, known by the management

function, of a ServingGWFunction managed by another management

function.";

reference "3GPP TS 28.658";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses ExternalServingGWFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

augment "/subnet3gpp:SubNetwork" {

if-feature subnet3gpp:ExternalsUnderSubNetwork ;

uses ExternalServingGWFunctionWrapper;

}

augment "/eutranet3gpp:EUtraNetwork" {

if-feature eutranet3gpp:ExternalsUnderEUtraNetwork;

uses ExternalServingGWFunctionWrapper;

}

}

## E.5.15 module \_3gpp-nr-nrm-externalupffunction@2019-10-28.yang

module \_3gpp-nr-nrm-externalupffunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-externalupffunction";

prefix "extupf3gpp";

import \_3gpp-common-managed-function { prefix mf3gpp; }

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

import \_3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }

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

organization "3GPP SA5";

description "Defines the YANG mapping of the ExternalUPFFunction Information

Object Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping ExternalUPFFunctionGrp {

description "Represents the ExternalUPFFunction IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

}

grouping ExternalUPFFunctionWrapper {

list ExternalUPFFunction {

description "Represents the properties, known by the management

function, of a UPFFunction managed by another management

function.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses ExternalUPFFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

augment "/subnet3gpp:SubNetwork" {

if-feature subnet3gpp:ExternalsUnderSubNetwork ;

uses ExternalUPFFunctionWrapper;

}

augment "/nrnet3gpp:NRNetwork" {

if-feature nrnet3gpp:ExternalsUnderNRNetwork;

uses ExternalUPFFunctionWrapper;

}

}

## E.5.16 module \_3gpp-nr-nrm-gnbcucpfunction.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-gnbcucpfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-gnbcucpfunction";

prefix "gnbcucp3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

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

import \_3gpp-nr-nrm-rrmpolicy { prefix nrrrmpolicy3gpp; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the GNBCUCPFunction Information

Object Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-11-06 { reference "CR-0611"; }

revision 2021-11-05 { reference "CR-0609"; }

revision 2020-10-02 { reference CR-0384 ; }

revision 2020-08-06 { reference "CR-0333"; }

revision 2020-08-03 { reference "CR-0321"; }

revision 2020-06-03 { reference "CR-0286"; }

revision 2020-05-08 { reference S5-203316 ; }

revision 2020-04-28 { reference "0260"; }

revision 2020-02-14 { reference S5-20XXXX ; }

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

feature DESManagementFunction {

description "Classs representing Distributed SON Energy Saving feature";

}

feature DANRManagementFunction {

description "Classs representing D-SON function of ANR Management feature";

}

feature DMROFunction {

description "Classs representing D-SON function of MRO feature";

}

grouping GNBCUCPFunctionGrp {

description "Represents the GNBCUCPFunction IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

uses nrrrmpolicy3gpp:RRMPolicy\_Grp;

leaf gNBId {

description "Identifies a gNB within a PLMN. The gNB Identifier (gNB ID)

is part of the NR Cell Identifier (NCI) of the gNB cells.";

reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";

mandatory true;

type int64 { range "0..4294967295"; }

}

leaf gNBIdLength {

description "Indicates the number of bits for encoding the gNB ID.";

reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";

mandatory true;

type int32 { range "22..32"; }

}

leaf gNBCUName {

description "Identifies the Central Unit of an gNB.";

reference "3GPP TS 38.473";

mandatory true;

type string { length "1..150"; }

}

list pLMNId {

description "The PLMN identifier to be used as part of the global RAN

node identity.";

key "mcc mnc";

min-elements 1;

max-elements 1;

uses types3gpp:PLMNId;

}

leaf-list x2BlackList {

type string;

description "List of nodes to which X2 connections are prohibited.";

}

leaf-list x2WhiteList {

type string;

description "List of nodes to which X2 connections are enforced.";

}

leaf-list xnBlackList {

type string;

description "List of nodes to which Xn connections are prohibited.";

}

leaf-list xnWhiteList {

type string;

description "List of nodes to which X2 connections are enforced.";

}

leaf-list xnHOBlackList {

type string;

description "List of nodes to which handovers over Xn are prohibited.";

}

leaf configurable5QISetRef {

type types3gpp:DistinguishedName;

description "DN of the Configurable5QISet that the GNBCUCPFunction supports (is associated to).";

}

leaf-list x2HOBlackList {

type string;

description "List of nodes to which handovers over X2 are prohibited.";

}

leaf dynamic5QISetRef {

type types3gpp:DistinguishedName;

description "DN of the Dynamic5QISet that the GNBCUCPFunction supports (is associated to).";

}

leaf dCHOControl {

type boolean;

description "This attribute determines whether the CHO function is enabled or disabled.";

}

leaf dDAPSHOControl {

type boolean;

description "This attribute determines whether the DAPS handover function

is enabled or disabled.";

}

}

augment "/me3gpp:ManagedElement" {

list GNBCUCPFunction {

description "Represents the logical function CU-CP of gNB and en-gNB.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses GNBCUCPFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<CODE ENDS>

## E.5.17 module \_3gpp-nr-nrm-gnbcuupfunction.yang

module \_3gpp-nr-nrm-gnbcuupfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-gnbcuupfunction";

prefix "gnbcuup3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

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

import \_3gpp-nr-nrm-rrmpolicy { prefix nrrrmpolicy3gpp; }

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

organization "3GPP SA5";

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

description "Defines the YANG mapping of the GNBCUUPFunction Information

Object Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2020-11-05 { reference CR-0412 ; }

revision 2020-08-06 { reference "CR-0333"; }

revision 2020-08-03 { reference "CR-0321"; }

revision 2020-06-03 { reference "CR-0286"; }

revision 2020-05-28 { reference "CR-0318"; }

revision 2020-03-12 { reference "SP-200233 S5-201547"; }

revision 2020-02-14 { reference S5-20XXXX ; }

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-08-21 { reference "Initial revision"; }

grouping TAIGrp {

description "Tracking Area Identity";

list pLMNId {

key "mcc mnc";

description "PLMN IDs for the Tracking area";

uses types3gpp:PLMNId;

}

leaf nRTAC {

type int64;

description "Identity of the common Tracking Area Code for the PLMNs

allowedValues:

a) It is the TAC or Extended-TAC.

b) A cell can only broadcast one TAC or Extended-TAC.

See TS 36.300, subclause 10.1.7 (PLMNID and TAC relation).

c) TAC is defined in subclause 19.4.2.3 of 3GPP TS 23.003 and

Extended-TAC is defined in subclause 9.3.1.29 of 3GPP TS 38.473.

d) For a 5G SA (Stand Alone), it has a non-null value.";

}

}

grouping BackhaulAddressGrp {

description "Indicates the backhauladdress of gNB.";

leaf gNBId {

type uint32 {

range "0..4294967295";

}

description "It identifies a gNB within a PLMN. The gNB ID is part of

the NR Cell Identifier (NCI) of the gNB cells.";

reference "gNB Identifier (gNB ID) of subclause 8.2 of TS 38.300.

Global gNB ID in subclause 9.3.1.6 of TS 38.413";

}

list tAI {

key nRTAC;

min-elements 1;

max-elements 1;

description "Tracking Area Identity";

reference "subclause 9.3.3.11 in TS 38.413";

uses TAIGrp;

}

}

grouping MappingSetIDBackhaulAddressGrp {

description "Mapping relationship between setID and backhaulAddress of gNB";

leaf idx {

type uint32 ;

description "ID value";

}

leaf setID {

type uint32;

mandatory true;

description "Indicates the setID of gNB.";

reference "Subclause 7.4.1.6 in TS 38.211";

}

list backhaulAddress {

key gNBId;

min-elements 1;

max-elements 1;

description "Indicates the backhauladdress of gNB.";

uses BackhaulAddressGrp;

}

}

grouping GNBCUUPFunctionGrp {

description "Represents the GNBCUUPFunction IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

uses nrrrmpolicy3gpp:RRMPolicy\_Grp;

leaf gNBCUUPId {

type uint64 {

range "0..68719476735" ;

}

config false;

mandatory true;

description "Identifies the gNB-CU-UP at least within a gNB-CU-CP";

reference "'gNB-CU-UP ID' in subclause 9.3.1.15 of 3GPP TS 38.463";

}

leaf gNBId {

type uint32;

mandatory true;

description "Identifies a gNB within a PLMN. The gNB ID is part of the

NR Cell Identifier (NCI) of the gNB cells. ";

reference "gNB Identifier (gNB ID) of subclause 8.2 of TS 38.300.

Global gNB ID in subclause 9.3.1.6 of TS 38.413";

}

leaf gNBIdLength {

mandatory true;

type int32 { range "22..32"; }

description "Indicates the number of bits for encoding the gNB Id.";

reference "gNB Id in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";

}

list pLMNInfoList {

description "The PLMNInfoList is a list of PLMNInfo data type. It

defines which PLMNs that can be served by the GNBCUUPFunction and

which S-NSSAIs can be supported by the GNBCUUPFunction for

corresponding PLMN in case of network slicing feature is supported";

key "mcc mnc sd sst";

uses types5g3gpp:PLMNInfo;

}

list mappingSetIDBackhaulAddressList {

key idx;

description "Specifies a list of mappingSetIDBackhaulAddress used to

retrieve the backhaul address of the victim set.

Must be present if Remote Interference Management function is

supported.";

uses MappingSetIDBackhaulAddressGrp;

}

leaf configurable5QISetRef {

type types3gpp:DistinguishedName;

description "DN of the Configurable5QISet that the GNBCUUPFunction

supports (is associated to).";

}

leaf dynamic5QISetRef {

type types3gpp:DistinguishedName;

description "DN of the Dynamic5QISet that the GNBCUUPFunction

supports (is associated to).";

}

}

augment "/me3gpp:ManagedElement" {

list GNBCUUPFunction {

key id;

description "Represents the logical function CU-UP of gNB or en-gNB.";

reference "3GPP TS 28.541";

uses top3gpp:Top\_Grp;

container attributes {

uses GNBCUUPFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

## E.5.18 module \_3gpp-nr-nrm-gnbdufunction.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-gnbdufunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-gnbdufunction";

prefix "gnbdu3gpp";

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

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

import \_3gpp-nr-nrm-rrmpolicy { prefix nrrrmpolicy3gpp; }

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

organization "3GPP SA5";

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

description "Defines the YANG mapping of the GNBDUFunction Information

Object Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-10-28 { reference CR-0607 ; }

revision 2021-04-30 { reference CR-0490; }

revision 2020-10-02 { reference CR-0384 ; }

revision 2020-03-12 { reference "SP-200233 S5-201547" ; }

revision 2020-02-14 { reference S5-20XXXX ; }

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-08-21 { reference "Initial revision."; }

feature DRACHOptimizationFunction {

description "Class representing D-SON function of RACH optimization

feature";

}

grouping RimRSReportInfoGrp {

description "This data type defines necessary reporting information

derived from the detected RIM-RS, including

1) The detected set ID;

2) Propagation delay in number of OFDM symbols

3) Functionality of the RS (RS-1 or RS-2, Enough or Not enough

mitigation for RS-1).

RS-1 is equivalent to RIM-RS type 1 (see 38.211, subclause 7.4.1.6).

RS-2 is equivalent to RIM-RS type 2 (see 38.211, subclause 7.4.1.6).

Enough mitigation for RS-1 means 'Enough' / 'Not enough' indication

functionality is enabled for RIM RS-1 and RIM-RS type 1 is used to

indicate 'enough mitigation' functionality.

Not enough mitigation for RS-1 means 'Enough' / 'Not enough' indication

functionality is enabled for RIM RS-1 and RIM-RS type 1 is used to

indicate 'Not enough mitigation' functionality.";

leaf detectedSetID {

type uint32 ;

description "Set ID of the detected RIM-RS

allowedValues: 0,1...max{totalnrofSetIdofRS1, totalnrofSetIdofRS2}";

}

leaf propagationDelay {

type uint32 ;

must '. <= ../../maxPropagationDelay' {

error-message "allowedValues: 0, 1.. maxPropagationDelay";

}

description "This attribute indicates the propagation delay of the

detected RIM-RS, in number of OFDM symbol.";

}

leaf functionalityOfRIMRS {

type enumeration {

enum RS1;

enum RS2;

enum RS1\_FOR\_ENOUGH\_MITIGATION;

enum RS1\_FOR\_NOT\_ENOUGH\_MITIGATION;

}

mandatory true;

description "Indicates the functionality of the detected RIM-RS.

If the indication of enableEnoughNotEnoughIndication is 'enabled',

valid values are {RS2, RS1forEnoughMitigation,

RS1forNotEnoughMitigation};

If the indication of enableEnoughNotEnoughIndication is 'disabled',

valid values are {RS1, RS2}.

RS1forEnoughMitigation means RIM-RS type 1 is used to indicate

'enough mitigation' functionality.

RS1forNotEnoughMitigation means RIM-RS type 1 is used to indicate

'Not enough mitigation' functionality.";

}

}

grouping RimRSReportConfGrp {

description "Defines RIM-RS reporting configuration";

leaf reportIndicator {

type types3gpp:EnabledDisabled;

default DISABLED;

description "Used to enable or disable the RS report on a gNB.

If the indication is 'enable', the gNB starts to periodically report

necessary information derived from the detected RIM-RS to OAM.

If the indication is 'disable', the gNB stops reporting.";

}

leaf reportInterval {

type uint32;

mandatory true;

units ms;

description "Used to define reporting interval of a gNB in ms.";

}

leaf nrofRIMRSReportInfo {

type uint32;

mandatory true;

description "Used to define the maximum number of RIMRSReportInfo in

a single report.";

}

leaf maxPropagationDelay {

type uint32 {

range "0..327679";

}

mandatory true;

description "Used to define the maximum reported OFDM symbol number for

the propagation delay of the detected RIM-RS in each RIMRSReportInfo.

allowedValues: 0, 1..20\*\*2\*maxNrofSymbols-1, where maxNrofSymbols=14.";

}

list RimRSReportInfoList {

key detectedSetID;

description "Represents a list (the length of the list is

nrofRIMRSReportInfo) of necessary information derived from the

detected RIM-RS.";

uses RimRSReportInfoGrp;

}

}

grouping GNBDUFunctionGrp {

description "Represents the GNBDUFunction IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

uses nrrrmpolicy3gpp:RRMPolicy\_Grp;

leaf gNBId {

type int64 { range "0..4294967295"; }

mandatory true;

description "Identifies a gNB within a PLMN. The gNB Identifier (gNB ID)

is part of the NR Cell Identifier (NCI) of the gNB cells.";

reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";

}

leaf gNBIdLength {

type int32 { range "22..32"; }

mandatory true;

description "Indicates the number of bits for encoding the gNB ID.";

reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";

}

leaf gNBDUId {

type int64 { range "0..68719476735"; }

mandatory true;

description "Uniquely identifies the DU at least within a gNB.";

reference "3GPP TS 38.473";

}

leaf gNBDUName {

type string { length "1..150"; }

description "Identifies the Distributed Unit of an NR node";

reference "3GPP TS 38.473";

}

list rimRSReportConf {

key reportInterval;

config false;

min-elements 1;

max-elements 1;

description "Used to configure gNBs to report the all necessary

information derived from the detected RIM-RS to OAM.";

uses RimRSReportConfGrp;

}

list pLMNInfoList {

description "The PLMNInfoList is a list of PLMNInfo data type. It

defines which PLMNs that can be served by the NR cell, and which

S-NSSAIs that can be supported by the NR cell for corresponding PLMN

in case of network slicing feature is supported. The plMNId of the

first entry of the list is the PLMNId used to construct the nCGI for

the NR cell.";

key "mcc mnc sd sst";

min-elements 1;

ordered-by user;

uses types5g3gpp:PLMNInfo;

}

}

augment "/me3gpp:ManagedElement" {

list GNBDUFunction {

key id;

description "Represents the logical function DU of gNB or en-gNB.";

reference "3GPP TS 28.541";

uses top3gpp:Top\_Grp;

container attributes {

uses GNBDUFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<CODE ENDS>

## E.5.19 module \_3gpp-nr-nrm-nrcellcu.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-nrcellcu {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-nrcellcu";

prefix "nrcellcu3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }

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

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

organization "3GPP SA5";

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

description "Defines the YANG mapping of the NRCellCU Information Object

Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-01-25 { reference CR-0454 ; }

revision 2020-11-25 { reference CR-0386 ; }

revision 2020-11-05 { reference CR-0412 ; }

revision 2020-10-02 { reference CR-0384 ; }

revision 2020-05-08 { reference S5-203316 ; }

revision 2020-02-14 { reference S5-20XXXX ; }

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 { reference "Initial revision"; }

feature DPCIConfigurationFunction {

description "Class representing Distributed SON

function of PCI configuration feature";

}

feature DESManagementFunction {

description "Class representing Distributed SON

Energy Saving feature";

}

feature DMROFunction {

description "Class representing D-SON function of MRO feature";

}

feature CESManagementFunction {

description "Class representing Centralized SON Energy Saving

feature";

}

grouping NRCellCUGrp {

description "Represents the NRCellCU IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

leaf cellLocalId {

description "Identifies an NR cell of a gNB. Together with corresponding

gNB ID it forms the NR Cell Identifier (NCI).";

mandatory true;

type int32 { range "0..16383"; }

}

list pLMNInfoList {

description "The PLMNInfoList is a list of PLMNInfo data type. It defines

which PLMNs that can be served by the NR cell, and which S-NSSAIs that

can be supported by the NR cell for corresponding PLMN in case of

network slicing feature is supported.";

// Note: Whether the attribute pLMNId in the pLMNInfo can be writable

// depends on the implementation.

key "mcc mnc sd sst";

min-elements 1;

uses types5g3gpp:PLMNInfo;

}

leaf nRFrequencyRef {

description "Reference to corresponding NRFrequency instance.";

config false;

type types3gpp:DistinguishedName;

}

}

augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction" {

list NRCellCU {

description "Represents the information required by CU that is

responsible for the management of inter-cell mobility and neighbour

relations via ANR.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses NRCellCUGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<CODE ENDS>

## E.5.20 module \_3gpp-nr-nrm-nrcelldu.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-nrcelldu {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-nrcelldu";

prefix "nrcelldu3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

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

import \_3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

import \_3gpp-nr-nrm-rrmpolicy { prefix nrrrmpolicy3gpp; }

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

import ietf-yang-types { prefix yang; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the NRCellDU Information Object

Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-10-28 { reference CR-0607 ; }

revision 2021-01-25 { reference CR-0454 ; }

revision 2020-11-25 { reference CR-0386 ; }

revision 2020-11-05 { reference CR-0412 ; }

revision 2020-10-02 { reference CR-0384 ; }

revision 2020-05-08 { reference S5-203316 ; }

revision 2020-02-14 { reference S5-20XXXX ; }

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-09-03 { reference "Initial revision"; }

feature DRACHOptimizationFunction {

description "Class representing D-SON function of RACH optimization

feature";

}

feature CPCIConfigurationFunction {

description "Class representing Centralized SON function of

PCI configuration feature";

}

grouping NPNIdentityGrp {

description "Represents the NPN supported by the <<IOC>> using this

<<dataType>> as one of its attributes in case of the cell is a

NPN-only cell.";

list plmnid {

key "mcc mnc";

min-elements 1;

description "PLMNId";

uses types3gpp:PLMNId;

}

leaf cAGIdList {

type string;

mandatory true;

description "It identifies a CAG list containing up to 12 CAG-identifiers

per PLMN Identity, see TS 38.331.

CAG is used for the PNI-NPNs to prevent UE(s), which are not allowed

to access the NPN via the associated cell(s), from automatically

selecting and accessing the associated CAG cell(s).

CAG ID is used to combine with PLMN ID to identify a PNI-NPN.

Exist if the cell is a NPN-only cell see TS 38.331";

}

leaf nIDList {

type string;

mandatory true;

description "It identifies a list of NIDs containing up to 12 NIDs per

PLMN Identity, see TS 38.331.

NID is used to combine with PLMN ID to identify an SNPN.

Exist if the cell is a NPN-only cell see TS 38.331";

}

}

grouping NRCellDUGrp {

description "Represents the NRCellDU IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

uses nrrrmpolicy3gpp:RRMPolicy\_Grp;

leaf cellLocalId {

description "Identifies an NR cell of a gNB. Together with the

corresponding gNB identifier in forms the NR Cell Identity (NCI).";

reference "NCI in 3GPP TS 38.300";

mandatory true;

type int32 { range "0..16383"; }

}

leaf operationalState {

description "Operational state of the NRCellDU instance. Indicates

whether the resource is installed and partially or fully operable

(ENABLED) or the resource is not installed or not operable

(DISABLED).";

config false;

type types3gpp:OperationalState;

}

leaf administrativeState {

description "Administrative state of the NRCellDU. Indicates the

permission to use or prohibition against using the cell, imposed

through the OAM services.";

type types3gpp:AdministrativeState;

default LOCKED;

}

leaf cellState {

description "Cell state of the NRCellDU instance. Indicates whether the

cell is not currently in use (IDLE), or currently in use but not

configured to carry traffic (INACTIVE), or currently in use and is

configured to carry traffic (ACTIVE).";

config false;

type types3gpp:CellState;

}

list pLMNInfoList {

description "The PLMNInfoList is a list of PLMNInfo data type. It

defines which PLMNs that can be served by the NR cell, and which

S-NSSAIs that can be supported by the NR cell for corresponding PLMN

in case of network slicing feature is supported. The plMNId of the

first entry of the list is the PLMNId used to construct the nCGI for

the NR cell.";

key "mcc mnc sd sst";

min-elements 1;

ordered-by user;

uses types5g3gpp:PLMNInfo;

}

list nPNIdentityList {

key idx ;

min-elements 1;

ordered-by user;

description "It defines which NPNs that can be served by the NR cell,

and which CAG IDs or NIDs can be supported by the NR cell for

corresponding PNI-NPN or SNPN in case of the cell is NPN-only cell.";

reference "3GPP TS 38.331";

leaf idx { type uint32 ; }

uses NPNIdentityGrp;

}

leaf nRPCI {

description "The Physical Cell Identity (PCI) of the NR cell.";

reference "3GPP TS 36.211";

mandatory true;

type int32 { range "0..1007"; }

}

leaf nRTAC {

description "The common 5GS Tracking Area Code for the PLMNs.";

reference "3GPP TS 23.003, 3GPP TS 38.473";

type types3gpp:Tac;

}

leaf arfcnDL {

description "NR Absolute Radio Frequency Channel Number (NR-ARFCN) for

downlink.";

reference "3GPP TS 38.104";

mandatory true;

type int32;

}

leaf arfcnUL {

description "NR Absolute Radio Frequency Channel Number (NR-ARFCN) for

uplink.";

reference "3GPP TS 38.104";

type int32;

}

leaf arfcnSUL {

description "NR Absolute Radio Frequency Channel Number (NR-ARFCN) for

supplementary uplink.";

reference "3GPP TS 38.104";

type int32;

}

leaf bSChannelBwDL {

description "Base station channel bandwidth for downlink.";

reference "3GPP TS 38.104";

type int32;

units MHz;

}

leaf rimRSMonitoringStartTime {

type yang:date-and-time ;

mandatory true;

description "Configures the UTC time when the gNB attempts to start

RIM-RS monitoring.";

}

leaf rimRSMonitoringStopTime {

type yang:date-and-time ;

mandatory true;

description "Configures the UTC time when the gNB stops RIM-RS

monitoring.";

}

leaf rimRSMonitoringWindowDuration {

type uint32 {

range 1..16384 ;

}

mandatory true;

description "Configures a duration of the monitoring window in which

gNB monitors the RIM-RS, in unit of P\_t, where P\_t is the RIM-RS

transmission periodicity in units of uplink-downlink switching period (

see 38.211 subclause 7.4.1.6).

This field is configured together with rimRSMonitoringInterval,

rimRSMonitoringWindowStartingOffset, rimRSMonitoringOccasionInterval

and rimRSMonitoringOccasionStartingOffset.

The duration of the monitoring window is expected to be larger than

or equal to M\*P\_t, where M is the interval between adjacent monitoring

occasions within the monitoring window

(configured by rimRSMonitoringInterval).

The absolute duration of the monitoring window is not expected to be

larger than the periodicity of the monitoring window (configured by

rimRSMonitoringWindowPeriodicity).

See 3GPP TS 28.541 attribute descrition rimRSMonitoringWindowDuration

for the exact math formulas.

Only the earliest N\_T consecutive detection durations in each RIM-RS

transmission periodicity (P\_t) in the monitoring window are taken as

valid time for monitoring potential interference, and they are

consecutively monitored in the monitoring window, while the residual

part of each RIM-RS transmission periodicity is not used for

discovering potential interference, where, a consecutive detection

duration spans P1\*R1 (if only P1 is configured) or ((P1+P2))/2\*R1 (

if both P1 and P2 are configured), where,

R1 is the number of consecutive uplink-downlinkswitching periods

for RS-1 (configured by nrofConsecutiveRIMRS1),

P1 is the first uplink-downlinkswitching period (configured by

dlULSwitchingPeriod1),

P2 is the second uplink-downlink switching period (configured by

dlULSwitchingPeriod2), and

N\_T=

((N\_setID # RIM,1)/(N\_f # RI N\_s # RIM,1)

if enableEnoughNotEnoughIndication is 'disable'

(2N\_setID # RIM,1)/(N\_f # RIM N\_s # RIM,1)

if enableEnoughNotEnoughIndication is 'enable'

N\_setID # 'RIM,1' is the total number of set IDs for RIM RS-1

(configured by totalnrofSetIdofRS1),

N\_f # RIM is the number of candidate frequency resources in the whole

network (configured by nrofGlobalRIMRSFrequencyCandidates), and

N\_s # 'RIM,1' is the number of candidate sequences assigned for

RIM RS-1 (configured by nrofRIMRSSequenceCandidatesofRS1).";

}

leaf rimRSMonitoringWindowStartingOffset {

type uint8 {

range 0..23 ;

}

mandatory true;

units hours;

description "Configures the start offset of the first monitoring window

within one day, in unit of hours.";

}

leaf rimRSMonitoringWindowPeriodicity {

type uint8 {

range 1|2|3|4|6|8|12|24 ;

}

units hours;

mandatory true;

description "Configures the periodicity of the monitoring window, in

unit of hours";

}

leaf rimRSMonitoringOccasionInterval {

type uint32 {

range 1..max ;

}

mandatory true;

description "Configures the interval between adjacent monitoring

occasions (M) within the monitoring window, in unit of consecutive

detection duration.

M is expected to be prime to N\_T, where N\_T is given in above

attribute rimRSMonitoringWindowDuration.

allowedValues: 1,2..N\_T-1";

}

leaf rimRSMonitoringOccasionStartingOffset {

type uint32 ;

mandatory true;

description "Configures the start offset of the first monitoring occasions

within the monitoring window (S\_M), in unit of consecutive detection

duration.

gNB starts monitoring potential interference from the S\_M-th consecutive

detection duration in the first complete RIM-RS transmission

periodicity (P\_t) within the monitoring window.

allowedValues: 0,1,2..M-1

where M is the the interval between adjacent monitoring occasions

within the monitoring window

(configured by rimRSMonitoringOccasionInterval)";

}

leaf ssbFrequency {

description "Indicates cell defining SSB frequency domain position.

Frequency (in terms of NR-ARFCN) of the cell defining SSB transmission.

The frequency identifies the position of resource element RE=#0

(subcarrier #0) of resource block RB#10 of the SS block. The frequency

must be positioned on the NR global frequency raster, as defined in

3GPP TS 38.101-1, and within bSChannelBwDL.";

mandatory true;

type int32 { range "0..3279165"; }

}

leaf ssbPeriodicity {

description "Indicates cell defined SSB periodicity. The SSB periodicity

is used for the rate matching purpose.";

mandatory true;

type int32 { range "5 | 10 | 20 | 40 | 80 | 160"; }

units "subframes (ms)";

}

leaf ssbSubCarrierSpacing {

description "Subcarrier spacing of SSB. Only the values 15 kHz or 30 kHz

(< 6 GHz), 120 kHz or 240 kHz (> 6 GHz) are applicable.";

reference "3GPP TS 38.211";

mandatory true;

type int32 { range "15 | 30 | 120 | 240"; }

units kHz;

}

leaf ssbOffset {

description "Indicates cell defining SSB time domain position. Defined

as the offset of the measurement window, in which to receive SS/PBCH

blocks, where allowed values depend on the ssbPeriodicity

(ssbOffset < ssbPeriodicity).";

mandatory true;

type int32 { range "0..159"; }

units "subframes (ms)";

}

leaf ssbDuration {

description "Duration of the measurement window in which to receive

SS/PBCH blocks.";

reference "3GPP TS 38.213";

mandatory true;

type int32 { range "1..5"; }

units "subframes (ms)";

}

leaf bSChannelBwUL {

description "Base station channel bandwidth for uplink.";

reference "3GPP TS 38.104";

type int32;

units MHz;

}

leaf bSChannelBwSUL {

description "Base station channel bandwidth for supplementary uplink.";

reference "3GPP TS 38.104";

type int32;

units MHz;

}

leaf-list nRSectorCarrierRef {

description "Reference to corresponding NRSectorCarrier instance.";

min-elements 1;

type types3gpp:DistinguishedName;

}

leaf-list bWPRef {

description "Reference to corresponding BWP instance.";

type types3gpp:DistinguishedName;

}

leaf-list nRFrequencyRef {

description "Reference to corresponding NRFrequency instance.";

type types3gpp:DistinguishedName;

}

leaf victimSetRef {

type types3gpp:DistinguishedName;

mandatory true;

description "DN of a victim Set (RimRSSet)

Implemented if RIM feature is supported";

}

leaf aggressorSetRef {

type types3gpp:DistinguishedName;

mandatory true;

description "DN of an aggressor Set (RimRSSet)";

}

}

augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction" {

list NRCellDU {

description "This IOC represents the part of NR cell information that

describes s the specific resources instances.

An NR cell transmits SS/PBCH block and always requires downlink

transmission at a certain carrier frequency with a certain channel

bandwidth. Transmission may be performed from multiple sector-carriers

using different transmission points, and these may be configured with

different carrier frequencies and channel bandwidths, as long as they

are aligned to the cell's downlink resource grids as defined in

subclause 4.4 in TS 38.211. The values of arfcnDL and bSChannelBwDL

attributes define the resource grids which each sector-carrier needs to

be aligned to. See subclauses 5.3 and 5.4.2 of TS 38.104 for definitions

of BS channel bandwidth and NR-ARFCN, respectively.

An NR cell requires an uplink in order to provide initial access. In

case of TDD, the values of arfcnUL and bSChannelBwUL have to always be

set to the same values as for the corresponding DL attributes. For both

FDD and TDD, the arfcnUL and bSChannelBwUL define uplink resource grids

to which each sector-carrier needs to align to.

An NR cell can in addition be configured with a supplementary uplink,

which has its own arfcnSUL and bSChannelBwSUL, which define resource

grids for supplementary uplink sector-carriers.

Each of downlink, uplink and supplementary uplink (if configured) need

an initial bandwidth part (BWP), which defines resources to be used by

UEs during and immediately after initial access. Additional BWPs can be

either configured or calculated by gNB internally and be applied to UEs

dynamically by gNB based on e.g. UE capability and bandwidth need of

each UE.";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses NRCellDUGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<CODE ENDS>

## E.5.21 module \_3gpp-nr-nrm-nrcellrelation.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-nrcellrelation {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-nrcellrelation";

prefix "nrcellrel3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

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

import \_3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }

import \_3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

organization "3GPP SA5";

description "Defines the YANG mapping of the NRCellRelation Information

Object Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-01-25 { reference CR-0454 ; }

revision 2020-06-03 { reference S5-202333 ; }

revision 2020-04-23 { reference CR0281 ; }

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-08-30 {

description "Initial revision";

}

typedef EnergySavingCoverage {

type enumeration {

enum FULL;

enum NO;

enum PARTIAL;

}

}

grouping NRCellRelationGrp {

description "Represents the NRCellRelation IOC.";

reference "3GPP TS 28.541";

leaf nRTCI {

description "Target NR Cell Identifier. It consists of NR Cell

Identifier (NCI) and Physical Cell Identifier of the target NR cell

(nRPCI).";

type uint64;

}

container cellIndividualOffset {

description "A set of offset values for the neighbour cell. Used when

UE is in connected mode. Defined for rsrpOffsetSSB, rsrqOffsetSSB,

sinrOffsetSSB, rsrpOffsetCSI-RS, rsrqOffsetCSI-RS and

sinrOffsetCSI-RS.";

reference "cellIndividualOffset in MeasObjectNR in 3GPP TS 38.331";

leaf rsrpOffsetSsb {

description "Offset value of rsrpOffsetSSB.";

default 0;

type types3gpp:QOffsetRange;

}

leaf rsrqOffsetSsb{

description "Offset value of rsrqOffsetSSB.";

default 0;

type types3gpp:QOffsetRange;

}

leaf sinrOffsetSsb {

description "Offset value of sinrOffsetSSB.";

default 0;

type types3gpp:QOffsetRange;

}

leaf rsrpOffsetCsiRs{

description "Offset value of rsrpOffsetCSI-RS.";

default 0;

type types3gpp:QOffsetRange;

}

leaf rsrqOffsetCsiRs {

description "Offset value of rsrqOffsetCSI-RS.";

default 0;

type types3gpp:QOffsetRange;

}

leaf sinrOffsetCsiRs {

description "Offset value of sinrOffsetCSI-RS.";

default 0;

type types3gpp:QOffsetRange;

}

}

leaf nRFreqRelationRef {

description "Reference to a corresponding NRFreqRelation instance.";

mandatory true;

type types3gpp:DistinguishedName;

}

leaf adjacentNRCellRef {

description "Reference to an adjacent NR cell (NRCellCU or

ExternalNRCellCU).";

mandatory true;

type types3gpp:DistinguishedName;

}

leaf isRemoveAllowed {

type boolean;

default true;

description "True if the ANR function in the node is allowed to remove this relation.";

}

leaf isHOAllowed {

type boolean;

default true;

description "True if handovers are allowed over this relation.";

}

leaf isESCoveredBy {

description "Indicates whether the adjacent cell

provides no, partial or full coverage for the parent cell

instance. Adjacent cells with this attribute equal to FULL are

recommended to be considered as candidate cells to take over the

coverage when the original cell is about to be changed to energy

saving state. All adjacent cells with this property equal

to PARTIAL are recommended to be considered as entirety of candidate

cells to take over the coverage when the original cell is about to be

changed to energy saving state.";

type EnergySavingCoverage;

}

}

augment /me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/nrcellcu3gpp:NRCellCU {

list NRCellRelation {

description "Represents a neighbour cell relation from a source cell

to a target cell, where the target cell is an NRCellCU or

ExternalNRCellCU instance.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses NRCellRelationGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<CODE ENDS>

## E.5.22 module \_3gpp-nr-nrm-nrfreqrelation@2019-10-28.yang

module \_3gpp-nr-nrm-nrfreqrelation {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-nrfreqrelation";

prefix "nrfreqrel3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

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

import \_3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }

import \_3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

organization "3GPP SA5";

description "Defines the YANG mapping of the NRFreqRelation Information

Object Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2020-04-23 { reference CR0281 ; }

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping NRFreqRelationGrp {

description "Represents the NRFreqRelation IOC.";

reference "3GPP TS 28.541";

container offsetMO {

description "A set of offset values applicable to all measured cells

with reference signal(s) indicated in corresponding MeasObjectNR. It

is used to indicate a cell, beam or measurement object specific offset

to be applied when evaluating candidates for cell re-selection or when

evaluating triggering conditions for measurement reporting. It is

defined for rsrpOffsetSSB, rsrqOffsetSSB, sinrOffsetSSB,

rsrpOffsetCSI-RS, rsrqOffsetCSI-RS and sinrOffsetCSI-RS.";

reference "offsetMO in MeasObjectNR in 3GPP TS 38.331";

leaf rsrpOffsetSsb {

description "Offset value of rsrpOffsetSSB.";

default 0;

type types3gpp:QOffsetRange;

}

leaf rsrqOffsetSsb {

description "Offset value of rsrqOffsetSSB.";

default 0;

type types3gpp:QOffsetRange;

}

leaf sinrOffsetSsb {

description "Offset value of sinrOffsetSSB.";

default 0;

type types3gpp:QOffsetRange;

}

leaf rsrpOffsetCsiRs {

description "Offset value of rsrpOffsetCSI-RS.";

default 0;

type types3gpp:QOffsetRange;

}

leaf rsrqOffsetCsiRs {

description "Offset value of rsrqOffsetCSI-RS.";

default 0;

type types3gpp:QOffsetRange;

}

leaf sinrOffsetCsiRs {

description "Offset value of sinrOffsetCSI-RS.";

default 0;

type types3gpp:QOffsetRange;

}

}

leaf-list blackListEntry {

description "A list of Physical Cell Identities (PCIs) that are

blacklisted in NR measurements.";

reference "3GPP TS 38.331";

min-elements 0;

type uint16 { range "0..1007"; }

}

leaf-list blackListEntryIdleMode {

description "A list of Physical Cell Identities (PCIs) that are

blacklisted in SIB4 and SIB5.";

min-elements 0;

type uint16 { range "0..1007"; }

}

leaf cellReselectionPriority {

description "The absolute priority of the carrier frequency used by the

cell reselection procedure. Value 0 means lowest priority. The value

must not already used by other RAT, i.e. equal priorities between RATs

are not supported. The UE behaviour when no value is entered is

specified in subclause 5.2.4.1 of 3GPP TS 38.304.";

reference "CellReselectionPriority in 3GPP TS 38.331, priority in

3GPP TS 38.304";

type uint32;

default 0;

}

leaf cellReselectionSubPriority {

description "Indicates a fractional value to be added to the value of

cellReselectionPriority to obtain the absolute priority of the

concerned carrier frequency for E-UTRA and NR.";

reference "3GPP TS 38.331";

type uint8 { range "2 | 4 | 6 | 8"; }

units "0.1";

}

leaf pMax {

description "Used for calculation of the parameter Pcompensation

(defined in 3GPP TS 38.304), at cell reselection to a cell.";

reference "PEMAX in 3GPP TS 38.101-1";

mandatory false;

type int32 { range "-30..33"; }

units dBm;

}

leaf qOffsetFreq {

description "The frequency specific offset applied when evaluating

candidates for cell reselection.";

mandatory false;

type types3gpp:QOffsetRange;

default 0;

}

leaf qQualMin {

description "Indicates the minimum required quality level in the cell.

Value 0 means that it is not sent and UE applies in such case the

(default) value of negative infinity for Qqualmin. Sent in SIB3 or

SIB5.";

reference "3GPP TS 38.304";

type int32 { range "-34..-3 | 0"; }

units dB;

default 0;

}

leaf qRxLevMin {

description "Indicates the required minimum received Reference Symbol

Received Power (RSRP) level in the NR frequency for cell reselection.

Broadcast in SIB3 or SIB5, depending on whether the related frequency

is intra- or inter-frequency. Resolution is 2.";

reference "3GPP TS 38.304";

mandatory true;

type int32 { range "-140..-44"; }

units dBm;

}

leaf threshXHighP {

description "Specifies the Srxlev threshold used by the UE when

reselecting towards a higher priority RAT/frequency than the current

serving frequency. Each frequency of NR and E-UTRAN might have a

specific threshold. Resolution is 2.";

reference "ThreshX, HighP in 3GPP TS 38.304";

mandatory true;

type int32 { range "0..62"; }

units dB;

}

leaf threshXHighQ {

description "Specifies the Squal threshold used by the UE when

reselecting towards a higher priority RAT/frequency than the current

serving frequency. Each frequency of NR and E-UTRAN might have a

specific threshold.";

reference "ThreshX, HighQ in 3GPP TS 38.304";

mandatory true;

type int32 { range "0..31"; }

units dB;

}

leaf threshXLowP {

description "Specifies the Srxlev threshold used by the UE when

reselecting towards a lower priority RAT/frequency than the current

serving frequency. Each frequency of NR and E-UTRAN might have a

specific threshold. Resolution is 2.";

reference "ThreshX, LowP in 3GPP TS 38.304";

mandatory true;

type int32 { range "0..62"; }

units dB;

}

leaf threshXLowQ {

description "Specifies the Squal threshold used by the UE when

reselecting towards a lower priority RAT/frequency than the current

serving frequency. Each frequency of NR and E-UTRAN might have a

specific threshold.";

reference "ThreshX, LowQ in 3GPP TS 38.304";

mandatory true;

type int32 { range "0..31"; }

units dB;

}

leaf tReselectionNR {

description "Cell reselection timer for NR.";

reference "TreselectionRAT for NR in 3GPP TS 38.331";

mandatory true;

type int32 { range "0..7"; }

units s;

}

leaf tReselectionNRSfHigh {

description "The attribute tReselectionNr (parameter TreselectionNR in

3GPP TS 38.304) is multiplied with this scaling factor if the UE is

in high mobility state.";

reference "Speed dependent ScalingFactor for TreselectionNR for high

mobility state in 3GPP TS 38.304";

mandatory true;

type uint8 { range "25 | 50 | 75 | 100"; }

units %;

}

leaf tReselectionNRSfMedium {

description "The attribute tReselectionNr (parameter TreselectionNR in

3GPP TS 38.304) multiplied with this scaling factor if the UE is in

medium mobility state.";

reference "Speed dependent ScalingFactor for TreselectionNR for medium

mobility state in 3GPP TS 38.304";

mandatory true;

type uint8 { range "25 | 50 | 75 | 100"; }

units %;

}

leaf nRFrequencyRef {

description "Reference to a corresponding NRFrequency instance.";

mandatory true;

type types3gpp:DistinguishedName;

}

}

augment /me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/nrcellcu3gpp:NRCellCU {

list NRFreqRelation {

description "Together with the target NRFrequency, it represents the

frequency properties applicable to the referencing NRFreqRelation.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses NRFreqRelationGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

## E.5.23 module \_3gpp-nr-nrm-nrfrequency@2019-10-28.yang

module \_3gpp-nr-nrm-nrfrequency {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-nrnetwork-nrfrequency";

prefix "nrfreq3gpp";

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }

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

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

organization "3GPP SA5";

description "Defines the YANG mapping of the NRFrequency Information Object

Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping NRFrequencyGrp {

description "Represents the NRFrequency IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

leaf absoluteFrequencySSB {

description "The absolute frequency applicable for a downlink NR carrier

frequency associated with the SSB, in terms of NR-ARFCN.";

mandatory true;

type uint32 { range "0.. 3279165"; }

}

leaf sSBSubCarrierSpacing {

description "Sub-carrier spacing of the SSB.";

mandatory true;

type uint8 { range "15 | 30 | 60 | 120"; }

units "kHz";

}

leaf-list multiFrequencyBandListNR {

description "List of additional frequency bands the frequency belongs to.

The list is automatically set by the gNB.";

config false;

min-elements 0;

type uint16 { range "1..256"; }

}

}

grouping NRFrequencyWrapper {

list NRFrequency {

description "Represents certain NR frequency properties.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses NRFrequencyGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

augment "/subnet3gpp:SubNetwork" {

if-feature subnet3gpp:ExternalsUnderSubNetwork ;

uses NRFrequencyWrapper;

}

augment "/nrnet3gpp:NRNetwork" {

if-feature nrnet3gpp:ExternalsUnderNRNetwork;

uses NRFrequencyWrapper;

}

}

## E.5.24 module \_3gpp-nr-nrm-nrnetwork@2019-06-17.yang

module \_3gpp-nr-nrm-nrnetwork {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-nrnetwork";

prefix "nrnet3gpp";

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

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

organization "3GPP SA5";

description "Defines the YANG mapping of the NRNetwork Information Object

Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2019-06-17 {

description "Initial revision";

}

feature ExternalsUnderNRNetwork {

description "Classes representing external entities like NRFrequency,

ExternalGNBCUCPFunction, ExternalGNBDUFunction

are contained under a NRNetwork list/class.";

}

grouping NRNetworkGrp {

description "Represents the NRNetwork IOC.";

reference "3GPP TS 28.541";

uses subnet3gpp:SubNetworkGrp;

}

list NRNetwork {

description "A subnetwork containing gNB external NR entities.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses NRNetworkGrp;

}

}

}

## E.5.25 module \_3gpp-nr-nrm-nrsectorcarrier.yang

module \_3gpp-nr-nrm-nrsectorcarrier {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-nrnetwork-nrsectorcarrier";

prefix "nrsectcarr3gpp";

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

import \_3gpp-common-managed-function { prefix mf3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

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

organization "3GPP SA5";

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

description "Defines the YANG mapping of the NRSectorCarrier Information

Object Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2020-05-28 { reference CR-0316 ; }

revision 2019-10-28 { reference S5-193518 ; }

revision 2019-06-17 {

description "Initial revision";

}

grouping NRSectorCarrierGrp {

description "Represents the NRSectorCarrier IOC.";

reference "3GPP TS 28.541";

uses mf3gpp:ManagedFunctionGrp;

leaf txDirection {

description "Indicates if the transmission direction is downlink,

uplink, or both downlink and uplink.";

mandatory true;

type types3gpp:TxDirection;

}

leaf configuredMaxTxPower {

description "Maximum transmisssion power at the antenna port for all

downlink channels, used simultaneously in a cell, added together.

Condition: The sector-carrier has a downlink and the

configuration of Tx power at antenna port reference point is supported.";

mandatory true;

type int32;

units mW;

}

leaf configuredMaxTxEIRP {

type int64;

units dBm;

mandatory true;

description "The maximum emitted isotroptic radiated power (EIRP) in dBm

for all downlink channels, used simultaneously in a cell, added together.

Condition: the sector-carrier has a downlink and the

configuration of emitted isotropic radiated power is supported";

}

leaf arfcnDL {

description "NR Absolute Radio Frequency Channel Number (NR-ARFCN)

for downlink.

Condition: The sector-carrier has a downlink AND the value

differs from the referring cell's value of arfcnDL.";

reference "3GPP TS 38.104";

mandatory true;

type int32 { range "0..3279165"; }

}

leaf arfcnUL {

description "NR Absolute Radio Frequency Channel Number (NR-ARFCN)

for uplink.

Condition: The sector-carrier has an uplink AND the value

differs from the referring cell's value of arfcnUL.";

reference "3GPP TS 38.104";

mandatory true;

type int32 { range "0..3279165"; }

}

leaf bSChannelBwDL {

description "Base station channel bandwitdth for downlink.

Condition: The sector-carrier has a downlink AND the value

differs from the referring cell's value of bSChannelBwDL.";

reference "3GPP TS 38.104";

mandatory true;

type int32 { range "5 | 10 | 15 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |

90 | 100"; }

units MHz;

}

leaf bSChannelBwUL {

description "Base station channel bandwitdth for uplink.";

reference "3GPP TS 38.104";

mandatory true;

type int32 { range "5 | 10 | 15 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |

90 | 100"; }

units MHz;

}

leaf sectorEquipmentFunctionRef {

description "Reference to corresponding SectorEquipmentFunction

instance.";

reference "3GPP TS 23.622";

mandatory true;

type types3gpp:DistinguishedName;

}

}

augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction" {

list NRSectorCarrier {

description "Represents the resources of each transmission point

included in the cell.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses NRSectorCarrierGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

## E.5.26 module \_3gpp-nr-nrm-rrmpolicy.yang

module \_3gpp-nr-nrm-rrmpolicy {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-rrmpolicy";

prefix "nrrrmpolicy3gpp";

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

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

organization "3GPP SA5";

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

description "Defines the YANG mapping of the RRMPolicy abstract class that

is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2020-11-05 { reference CR-0412 ; }

revision 2020-04-28 { reference "CR0285"; }

revision 2020-02-14 { reference "Initial revision"; }

grouping rRMPolicyMemberGrp {

description "This data type represents an RRM Policy member that will be

part of a rRMPolicyMemberList. A RRMPolicyMember is defined by its

pLMNId and sNSSAI (S-NSSAI).

The members in a rRMPolicyMemberList are assigned a specific amount of

RRM resources based on settings in RRMPolicy.";

uses types5g3gpp:PLMNInfo;

}

typedef CyclicPrefix {

type enumeration {

enum NORMAL;

enum EXTENDED;

}

}

grouping RRMPolicy\_Grp {

description "This IOC represents the properties of an abstract RRMPolicy

. The RRMPolicy\_ IOC needs to be subclassed to be instantiated.

It defines two attributes apart from those inherited from Top IOC, the

resourceType attribute defines type of resource (PRB, RRC

connected users, DRB usage etc.) and the rRMPolicyMemberList attribute

defines the RRMPolicyMember(s)that are subject to this policy.

An RRM resource (defined in resourceType

attribute) is located in NRCellDU, NRCellCU, GNBDUFunction,

GNBCUCPFunction or in GNBCUUPFunction. The RRMPolicyRatio IOC is one

realization of a RRMPolicy\_ IOC. This RRM framework allows adding new

policies, both standardized (like RRMPolicyRatio) or as vendor specific,

by inheriting from the abstract RRMPolicy\_ IOC.";

leaf resourceType {

description "The resourceType attribute defines type of resource (PRB,

RRC connected users, DRB usage etc.) that is subject to policy.

Valid values are 'PRB', 'PRB\_UL' , 'PRB\_DL','RRC' or 'DRB'";

mandatory true;

type enumeration {

enum PRB;

enum PRB\_UL;

enum PRB\_DL;

enum RRC;

enum DRB;

}

}

list rRMPolicyMemberList{

description "It represents the list of RRMPolicyMember (s) that the

managed object is supporting. A RRMPolicyMember <<dataType>> include

the PLMNId <<dataType>> and S-NSSAI <<dataType>>." ;

min-elements 1;

   key "mcc mnc sd sst";

uses rRMPolicyMemberGrp;

}

} // grouping

grouping RRMPolicyRatioGrp {

description "Represents the RRMPolicyRatio concrete IOC.";

uses RRMPolicy\_Grp; // Inherits RRMPolicy\_

leaf rRMPolicyMaxRatio {

description " This attribute specifies the maximum percentage of radio

resource that can be used by the associated rRMPolicyMemberList.

The maximum percentage of radio resource include at least one of

the shared resources, prioritized resources and dedicated resources.

The sum of the rRMPolicyMaxRatio values assigned to all RRMPolicyRatio(s)

name-contained by same ManagedEntity can be greater that 100.";

default 100;

type uint8 { range "0..100"; }

units percent;

}

leaf rRMPolicyMinRatio {

description " This attribute specifies the minimum percentage of radio

resources that can be used by the associated rRMPolicyMemberList.

The minimum percentage of radio resources including at least one of

prioritized resources and dedicated resources. The sum of the

rRMPolicyMinRatio values assigned to all RRM PolicyRatio(s)

name-contained by same ManagedEntity shall be less or equal 100.";

default 0;

type uint8 { range "0..100"; }

units percent;

}

leaf rRMPolicyDedicatedRatio {

description " This attribute specifies the percentage of radio resource

that dedicatedly used by the associated rRMPolicyMemberList. The sum of

the rRMPolicyDeidctaedRatio values assigned to all RRMPolicyRatio(s)

name-contained by same ManagedEntity shall be less or equal 100. ";

default 0;

type uint8 { range "0..100"; }

units percent;

}

}

list RRMPolicyRatio {

description " The RRMPolicyRatio IOC is one realization of a RRMPolicy\_ IOC,

see the inheritance in Figure 4.2.1.2-1. This RRM framework allows

adding new policies, both standardized (like RRMPolicyRatio) or as

vendor specific, by inheriting from the

abstract RRMPolicy\_ IOC. For details see subclause 4.3.36.";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses RRMPolicyRatioGrp;

}

}

}

## E.5.27 Void

## E.5.28 module \_3gpp-nr-nrm-danrmanagementfunction.yang

module \_3gpp-nr-nrm-danrmanagementfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-danrmanagementfunction";

prefix "danrmanagementfunction3gpp";

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

import \_3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the DANRManagementFunction Information Object Class

(IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2020-05-08 { reference S5-203316; }

grouping DANRManagementFunctionGrp {

description "Represents the DANRManagementFunction IOC.";

reference "3GPP TS 28.541";

uses top3gpp:Top\_Grp;

leaf intrasystemANRManagementSwitch {

description "This attribute determines whether the intra-system ANR function is activated or deactivated.";

type boolean;

}

leaf intersystemANRManagementSwitch {

description "This attribute determines whether the inter-system ANR function is activated or deactivated.";

type boolean;

}

}

augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction" {

if-feature gnbcucp3gpp:DANRManagementFunction;

uses DANRManagementFunctionGrp;

}

}

## E.5.29 module \_3gpp-nr-nrm-desmanagementfunction.yang

module \_3gpp-nr-nrm-desmanagementfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-desmanagementfunction";

prefix "desmf3gpp";

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

import \_3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

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

import \_3gpp-5g-common-yang-types { prefix type5g3gpp; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the DESManagementFunction

Information Object Class (IOC) that is part of the NR Network Resource

Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-08-05 { reference S5-214053/CR-0518; }

revision 2020-05-08 { reference S5-203316; }

grouping loadTimeThresholdGrp {

description "Represents the the traffic load threshold and the time

duration.";

leaf loadThreshold {

description "This attribute is used by distributed ES algorithms to allow

a cell to enter the energySaving state.";

type type5g3gpp:EnergySavingLoadThresholdT;

}

leaf timeDuration {

description "The time duration indicates how long the traffic load

(either for UL or DL) in the cell needs to have been above the

threshold to wake up one or more original cells which have been

provided backup coverage by the candidate cell.";

type type5g3gpp:EnergySavingTimeDurationT;

}

}

grouping DESManagementFunctionGrp {

description "Represents the DESManagementFunction IOC.";

leaf desSwitch {

description "This attribute determines whether the Distributed SON

energy saving function is enabled or disabled.";

type boolean;

}

list intraRatEsActivationOriginalCellLoadParameters {

description "This attributes is relevant, if the cell acts as an original

cell. This attribute indicates the traffic load threshold and the time

duration, which are used by distributed ES algorithms to allow a cell

to enter the energySaving state.";

key loadThreshold;

min-elements 1;

max-elements 1;

uses loadTimeThresholdGrp;

}

list intraRatEsActivationCandidateCellsLoadParameters {

description "This attribute indicates the traffic load threshold and the

time duration, which are used by distributed ES algorithms level to

allow an 'original' cell to enter the energySaving state.";

key loadThreshold;

min-elements 1;

max-elements 1;

uses loadTimeThresholdGrp;

}

list intraRatEsDeactivationCandidateCellsLoadParameters {

description "This attributes is relevant, if the cell acts as a candidate

cell.This attribute indicates the traffic load threshold and the time

duration which is used by distributed ES algorithms to allow a cell to

leave the energySaving state.";

key loadThreshold;

min-elements 1;

max-elements 1;

uses loadTimeThresholdGrp;

}

list esNotAllowedTimePeriod {

description "This is a list of time periods during which

inter-RAT energy saving is not allowed";

key idx;

leaf idx {

type uint32;

}

uses EsNotAllowedTimePeriodGrp;

}

list interRatEsActivationOriginalCellParameters {

description "This attribute indicates the traffic load threshold and the

time duration, which are used by distributed inter-RAT ES algorithms to

allow an original cell to enter the energySaving state.";

key loadThreshold;

min-elements 1;

max-elements 1;

uses loadTimeThresholdGrp;

}

list interRatEsActivationCandidateCellParameters {

description "This attribute indicates the traffic load threshold and the

time duration, which are used by distributed inter-RAT ES algorithms to

allow an original cell to enter the energySaving state.";

key loadThreshold;

min-elements 1;

max-elements 1;

uses loadTimeThresholdGrp;

}

list interRatEsDeactivationCandidateCellParameters {

description "This attribute indicates the traffic load threshold and the

time duration which is used by distributed inter-RAT ES algorithms to

allow an original cell to leave the energySaving state.";

key loadThreshold;

min-elements 1;

max-elements 1;

uses loadTimeThresholdGrp;

}

leaf energySavingState {

description "Specifies the status regarding the energy saving in the

cell.";

type enumeration {

enum isNotEnergySaving;

enum isEnergySaving;

}

}

leaf isProbingCapable {

description "This attribute indicates whether this cell is capable of

performing the ES probing procedure.";

type enumeration{

enum yes;

enum no;

}

}

}

grouping EsNotAllowedTimePeriodGrp {

leaf startTime {

description "Start of not allowed time period in UTC time zone.

If set, the endTime must also be set. If not set, this is

interpreted as around the clock.";

must ../endTime;

type type5g3gpp:UTC24TimeOfDayT;

}

leaf endTime {

description "If endTime has a lower value than startTime, it will

be interpreted as referring to the following day.";

type type5g3gpp:UTC24TimeOfDayT;

must ../startTime;

}

leaf-list daysOfWeek {

description "Specifies that the not allowed periods are only

applicable to the specified days in UTC timezone. Every day if

not set.";

type type5g3gpp:DayOfWeekT;

}

}

grouping DESManagementFunctionSubtree {

list DESManagementFunction {

description "This IOC represents the management capabilities of

Distributed SON Energy Saving (ES) functions. This is provided for

Energy Saving purposes.

In the case where multiple DESManagement MOIs exist at different

levels of the containment tree, the DESManagement MOI at the lower

level overrides the DESManagement MOIs at higher level(s) of the same

containment tree.";

reference "clause 6.2.3.0 in TS 28.310";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses DESManagementFunctionGrp;

}

}

}

augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/"+

"nrcellcu3gpp:NRCellCU" {

if-feature nrcellcu3gpp:DESManagementFunction;

uses DESManagementFunctionSubtree;

}

augment /me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction {

if-feature gnbcucp3gpp:DESManagementFunction;

uses DESManagementFunctionSubtree;

}

augment /me3gpp:ManagedElement {

if-feature me3gpp:DESManagementFunction;

uses DESManagementFunctionSubtree;

}

augment /subnet3gpp:SubNetwork {

if-feature subnet3gpp:DESManagementFunction;

uses DESManagementFunctionSubtree;

}

}

## E.5.30 module \_3gpp-nr-nrm-drachoptimizationfunction.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-drachoptimizationfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-drachoptimizationfunction";

prefix "dracho3gpp";

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

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

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-nr-nrm-nrcelldu { prefix nrcelldu3gpp; }

import \_3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the DRACHOptimizationFunction

Information Object Class (IOC) that is part of the NR Network Resource

Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-08-05 { reference S5-214053/CR-0518; }

revision 2021-01-25 { reference CR-0454 ; }

revision 2020-10-02 { reference "CR-0384, CR-0382" ; }

revision 2020-05-08 { reference S5-203316; }

typedef TargetProbabilityT {

type enumeration {

enum 25;

enum 50;

enum 75;

enum 90;

}

}

typedef NumberofpreamblessentT {

type uint32 {

range "1..200";

}

}

typedef AccessdelayT {

type uint32 {

range "10..560";

}

}

grouping NumPreableAccessDelayGrp {

description "Represents the target Access Probability (APn) for the RACH

optimization function.";

leaf targetProbability {

description "This attribute determines the target Probability.";

mandatory true;

type TargetProbabilityT;

}

leaf numberofpreamblessent {

description "This attribute determines the number of preambles sent.";

mandatory true;

type NumberofpreamblessentT;

}

}

grouping DRACHOptimizationFunctionGrp {

description "Represents the DRACHOptimizationFunction IOC.";

list ueAccProbilityDist {

description "This is a list of target Access Probability (APn) for the

RACH optimization function.";

key "targetProbability numberofpreamblessent";

uses NumPreableAccessDelayGrp;

}

list ueAccDelayProbilityDist {

description "This is a list of target Access Delay probability (ADP)

for the RACH optimization function.";

key "targetProbability numberofpreamblessent";

uses NumPreableAccessDelayGrp;

}

leaf drachOptimizationControl {

description "This attribute determines whether the RACH Optimization

function is enabled or disabled.";

type boolean;

}

}

grouping DRACHOptimizationFunctionSubtree {

list DRACHOptimizationFunction {

description "This IOC represents the management capabilities of

Centralized SON Energy Saving (ES) functions. This is provided for

Energy Saving purposes.

In the case where multiple CESManagement MOIs exist at different

levels of the containment tree, the CESManagement MOI at the lower

level overrides the CESManagement MOIs at higher level(s) of the

same containment tree.";

reference "clause 6.2.2 in TS 28.310";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses DRACHOptimizationFunctionGrp;

}

}

}

augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction/"+

"nrcelldu3gpp:NRCellDU" {

if-feature nrcelldu3gpp:DRACHOptimizationFunction;

uses DRACHOptimizationFunctionSubtree;

}

augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction" {

if-feature gnbdu3gpp:DRACHOptimizationFunction;

uses DRACHOptimizationFunctionSubtree;

}

augment "/me3gpp:ManagedElement" {

if-feature me3gpp:DRACHOptimizationFunction;

uses DRACHOptimizationFunctionSubtree;

}

augment "/subnet3gpp:SubNetwork" {

if-feature nrcelldu3gpp:DRACHOptimizationFunction;

uses DRACHOptimizationFunctionSubtree;

}

}

<CODE ENDS>

## E.5.31 module \_3gpp-nr-nrm-dmrofunction.yang

module \_3gpp-nr-nrm-dmrofunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-dmrofunction";

prefix "dmrof3gpp";

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

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

import \_3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the DMROFunction

Information Object Class (IOC) that is part of the NR Network Resource

Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2022-01-07 { reference CR-0633; }

revision 2021-08-05 { reference S5-214053/CR-0518; }

revision 2020-05-08 { reference S5-203316; }

grouping DMROFunctionGrp {

description "Represents the DMROFunction IOC.";

leaf maximumDeviationHoTriggerLow {

description "This parameter defines the maximum allowed lower

deviation of the Handover Trigger, from the default point of

operation.";

type int32 {range "-20..20";}

units "0.5 dB";

}

leaf maximumDeviationHoTriggerHigh {

description "This parameter defines the maximum allowed upper

deviation of the Handover Trigger, from the default point of

operation.";

type int32 {range "-20..20";}

units "0.5 dB";

}

leaf minimumTimeBetweenHoTriggerChange {

description "This parameter defines the minimum allowed time interval

between two Handover Trigger change performed by MRO. This is used to

control the stability and convergence of the algorithm.";

type uint32 {

range 0..604800; // <= 1 week

}

units seconds;

}

leaf tstoreUEcntxt {

description "The timer used for detection of too early HO, too late HO

and HO to wrong cell.";

type uint32 {

range 0..1023;

}

units "100 milliseconds";

}

leaf dmroControl {

description "This attribute determines whether the MRO function is

enabled or disabled.";

type boolean;

}

}

grouping DMROFunctionSubtree {

list DMROFunction {

description "This IOC contains attributes to support the D-SON function

of MRO.

In the case where multiple DMRO MOIs exist at different levels of the

containment tree, the DMRO MOI at the lower level overrides the DMRO

MOIs at higher level(s) of the same containment tree.";

reference "clause 7.1.2 in TS 28.313";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses DMROFunctionGrp;

}

}

}

augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/"+

"nrcellcu3gpp:NRCellCU" {

if-feature nrcellcu3gpp:DMROFunction;

uses DMROFunctionSubtree;

}

augment /me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction {

if-feature gnbcucp3gpp:DMROFunction;

uses DMROFunctionSubtree;

}

augment /me3gpp:ManagedElement {

if-feature me3gpp:DMROFunction;

uses DMROFunctionSubtree;

}

augment /subnet3gpp:SubNetwork {

if-feature subnet3gpp:DMROFunction;

uses DMROFunctionSubtree;

}

}

## E.5.32 module \_3gpp-nr-nrm-dpciconfigurationfunction.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-dpciconfigurationfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-dpciconfigurationfunction";

prefix "dpcicf3gpp";

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

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

import \_3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

import \_3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-5g-common-yang-types { prefix type5g3gpp; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the DPCIConfigurationFunction

Information Object Class (IOC) that is part of the NR Network Resource

Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-08-05 { reference S5-214053/CR-0518; }

revision 2021-01-25 { reference CR-0454 ; }

revision 2020-11-25 { reference CR-0386 ; }

revision 2020-05-08 { reference S5-203316; }

grouping DPCIConfigurationFunctionGrp {

description "Represents the DPCICONFIGURATIONFunction IOC.";

list nRPciList {

description "This holds a list of physical cell identities that can be

assigned to the NR cells. This attribute shall be supported if D-SON

PCI configuration function is supported.";

key NRPci;

leaf NRPci {

type type5g3gpp:PhysCellID;

}

}

leaf dPciConfigurationControl {

description "This attribute determines whether the Distributed SON PCI

configuration Function is enabled or disabled.";

type boolean;

}

}

grouping DPCIConfigurationFunctionSubtree {

list DPCIConfigurationFunction {

description "This IOC contains attributes to support the Distributed SON

function of PCI configuration.

In the case where multiple DPCIConfiguration MOIs exist at different

levels of the containment tree, the DPCIConfiguration MOI at the lower

level overrides the DPCIConfiguration MOIs at higher level(s) of the

same containment tree.";

reference "clause 7.1.3 in TS 28.313";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses DPCIConfigurationFunctionGrp;

}

}

}

augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/"+

"nrcellcu3gpp:NRCellCU" {

if-feature nrcellcu3gpp:DPCIConfigurationFunction;

uses DPCIConfigurationFunctionSubtree;

}

augment /me3gpp:ManagedElement {

if-feature me3gpp:DPCIConfigurationFunction;

uses DPCIConfigurationFunctionSubtree;

}

augment /subnet3gpp:SubNetwork {

if-feature subnet3gpp:DPCIConfigurationFunction;

uses DPCIConfigurationFunctionSubtree;

}

}

<CODE ENDS>

## E.5.33 module \_3gpp-nr-nrm-cpciconfigurationfunction.yang

module \_3gpp-nr-nrm-cpciconfigurationfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-cpciconfigurationfunction";

prefix "cpcicf3gpp";

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

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

import \_3gpp-nr-nrm-nrcelldu { prefix nrcelldu3gpp; }

import \_3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

organization "3GPP SA5";

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

description "Represents the CPCIConfigurationFunction Information Object

Class(IOC) that is part of the NR Network Resource Model.";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-08-05 { reference S5-214053/CR-0518; }

revision 2020-05-08 { reference S5-203316; }

grouping CPCIConfigurationFunctionGrp {

description "Represents the CPCIConfigurationFunction IOC.";

leaf cPciConfigurationControl {

description "This attribute determines whether the Centralized SON

PCI configuration function is enabled or disabled.";

type boolean;

mandatory true;

}

leaf-list cSonPciList {

type int32 { range "0..1007"; }

min-elements 1;

description "Holds a list of physical cell identities that can be

assigned to the pci attribute by gNB. The assignment algorithm is not

specified.

See TS 38.211 clause 7.4.2.1 for legal values of pci.

This attribute shall be supported if and only if the C-SON PCI

configuration is supported.";

reference "See TS 38.211 clause 7.4.2.1";

}

}

grouping CPCIConfigurationFunctionSubtree {

list CPCIConfigurationFunction {

description "This IOC contains attributes to support the Cross

Domain-Centralized SON function of PCI configuration

In the case where multiple CPCIConfiguration MOIs exist at different

levels of the containment tree, the CPCIConfiguration MOI at the lower

level overrides the CPCIConfiguration MOIs at higher level(s) of the

same containment tree.";

reference "clause 7.2.1 in TS 28.313";

key id;

uses top3gpp:Top\_Grp ;

container attributes {

uses CPCIConfigurationFunctionGrp ;

}

}

}

augment /me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction/nrcelldu3gpp:NRCellDU {

if-feature nrcelldu3gpp:CPCIConfigurationFunction;

uses CPCIConfigurationFunctionSubtree;

}

augment /me3gpp:ManagedElement {

if-feature me3gpp:CPCIConfigurationFunction;

uses CPCIConfigurationFunctionSubtree;

}

augment /subnet3gpp:SubNetwork {

if-feature subnet3gpp:CPCIConfigurationFunction;

uses CPCIConfigurationFunctionSubtree;

}

}

## E.5.34 module \_3gpp-nr-nrm-cesmanagementfunction.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-cesmanagementfunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-cesmanagementfunction";

prefix "cesmf3gpp";

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

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

import \_3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

import \_3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-5g-common-yang-types { prefix type5g3gpp; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the CESManagementFunction

Information Object Class (IOC) that is part of the NR Network Resource Model

(NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-08-05 { reference S5-214053/CR-0518; }

revision 2020-05-08 { reference S5-203316; }

grouping loadTimeThresholdGrp {

description "Represents the the traffic load threshold and the time

duration.";

leaf loadThreshold {

description "This attribute is used by distributed ES algorithms to allow

a cell to enter the energySaving state.";

type type5g3gpp:EnergySavingLoadThresholdT;

}

leaf timeDuration {

description "The time duration indicates how long the traffic load

(either for UL or DL) in the cell needs to have been above the

threshold to wake up one or more original cells which have been

provided backup coverage by the candidate cell.";

type type5g3gpp:EnergySavingLoadThresholdT;

}

}

grouping CESManagementFunctionGrp {

description "Represents the CESManagementFunction IOC.";

leaf cesSwitch {

description "This attribute determines whether the Centralized SON energy

saving function is enabled or disabled.";

type boolean;

default true;

}

list intraRatEsActivationOriginalCellLoadParameters {

description "This attributes is relevant, if the cell acts as an original

cell.This attribute indicates the traffic load threshold and the time

duration, which are used by distributed ES algorithms to allow a cell

to enter the energySaving state. The time duration indicates how long

the load needs to have been below the threshold.";

key loadThreshold;

min-elements 1;

max-elements 1;

uses loadTimeThresholdGrp;

}

list intraRatEsActivationCandidateCellsLoadParameters {

description "This attributes is relevant, if the cell acts as a candidate

cell. This attribute indicates the traffic load threshold and the time

duration, which are used by distributed ES algorithms level to allow an

'original' cell to enter the energySaving state. Threshold and duration

are applied to the candidate cell(s) which will provides coverage

backup of an original cell when it is in the energySaving state. The

threshold applies in the same way for a candidate cell, no matter for

which original cell it will provide backup coverage.

The time duration indicates how long the traffic in the candidate cell

needs to have been below the threshold before any original cells which

will be provided backup coverage by the candidate cell enters energy

saving state.";

key loadThreshold;

min-elements 1;

max-elements 1;

uses loadTimeThresholdGrp;

}

list intraRatEsDeactivationCandidateCellsLoadParameters {

description "This attributes is relevant, if the cell acts as a candidate

cell. This attribute indicates the traffic load threshold and the time

duration which is used by distributed ES algorithms to allow a cell to

leave the energySaving state. Threshold and time duration are applied

to the candidate cell when it which provides coverage backup for the

cell in energySaving state. The threshold applies in the same way for a

candidate cell, no matter for which original cell it provides backup

coverage.

The time duration indicates how long the traffic in the candidate cell

needs to have been above the threshold to wake up one or more original

cells which have been provided backup coverage by the candidate cell.";

key loadThreshold;

min-elements 1;

max-elements 1;

uses loadTimeThresholdGrp;

}

list esNotAllowedTimePeriod {

description "This is a list of time periods during which

inter-RAT energy saving is not allowed";

key idx;

leaf idx {

type uint32;

}

uses EsNotAllowedTimePeriodGrp;

}

list interRatEsActivationOriginalCellParameters {

description "This attribute is relevant, if the cell acts as an original

cell. This attribute indicates the traffic load threshold and the time

duration, which are used by distributed inter-RAT ES algorithms to

allow an original cell to enter the energySaving state. The time

duration indicates how long the traffic load (both for UL and DL) needs

to have been below the threshold.

In case the original cell is an EUTRAN cell, the load information

refers to Composite Available Capacity Group IE (see 3GPP TS 36.413

[12] Annex B.1.5) and the following applies:

Load = (100 - 'Capacity Value' ) \* 'Cell Capacity Class Value',

where 'Capacity Value' and 'Cell Capacity Class Value' are defined in

3GPP TS 36.423 [7].

In case the original cell is a UTRAN cell, the load information refers

to Cell Load Information Group IE (see 3GPP TS 36.413 [12] Annex B.1.5)

and the following applies:

Load= 'Load Value' \* 'Cell Capacity Class Value', where 'Load Value'

and 'Cell Capacity Class Value' are defined in 3GPP TS 25.413 [19].

If the 'Cell Capacity Class Value' is not known, then 'Cell Capacity

Class Value' should be set to 1 when calculating the load, and the load

threshold should be set in range of 0..100.";

key loadThreshold;

min-elements 1;

max-elements 1;

uses loadTimeThresholdGrp;

}

list interRatEsActivationCandidateCellParameters {

description "This attribute is relevant, if the cell acts as a candidate

cell. This attribute indicates the traffic load threshold and the time

duration, which are used by distributed inter-RAT ES algorithms to

allow an original cell to enter the energySaving state. Threshold and

time duration are applied to the candidate cell(s) which will provides

coverage backup of an original cell when it is in the energySaving

state. The time duration indicates how long the traffic load (both for

UL and DL) in the candidate cell needs to have been below the threshold

before any original cells which will be provided backup coverage by the

candidate cell enters energySaving state.

In case the candidate cell is a UTRAN or GERAN cell, the load

information refers to Cell Load Information Group IE (see 3GPP TS

36.413 [12] Annex B.1.5) and the following applies:

Load= 'Load Value' \* 'Cell Capacity Class Value', where 'Load Value'

and 'Cell Capacity Class Value' are defined in 3GPP TS 25.413 [19]

(for UTRAN) / TS 48.008 [20] (for GERAN).

If the 'Cell Capacity Class Value' is not known, then 'Cell Capacity

Class Value' should be set to 1 when calculating the load, and the load

threshold should be set in range of 0..100.";

min-elements 1;

max-elements 1;

key loadThreshold;

uses loadTimeThresholdGrp;

}

list interRatEsDeactivationCandidateCellParameters {

description "This attribute is relevant, if the cell acts as a candidate

cell. This attribute indicates the traffic load threshold and the time

duration which is used by distributed inter-RAT ES algorithms to allow

an original cell to leave the energySaving state. Threshold and time

duration are applied to the candidate cell which provides coverage

backup for the cell in energySaving state.

The time duration indicates how long the traffic load (either for UL or

DL) in the candidate cell needs to have been above the threshold to

wake up one or more original cells which have been provided backup

coverage by the candidate cell.

For the load see the definition of

interRatEsActivationCandidateCellParameters.

This attribute indicates the traffic load threshold and the time

duration which is used by distributed inter-RAT ES algorithms to allow

an original cell to leave the energySaving state.";

key loadThreshold;

min-elements 1;

max-elements 1;

uses loadTimeThresholdGrp;

}

leaf energySavingState {

description "Specifies the status regarding the energy saving in the

cell. If the value of energySavingControl is toBeEnergySaving, then it

shall be tried to achieve the value isEnergySaving for the

energySavingState. If the value of energySavingControl is

toBeNotEnergySaving, then it shall be tried to achieve the value

isNotEnergySaving for the energySavingState. ";

type enumeration{

enum isNotEnergySaving;

enum isEnergySaving;

}

}

leaf energySavingControl {

description "This attribute allows the Cross Domain-Centralized SON

energy saving function to initiate energy saving activation or

deactivation.";

type enumeration{

enum toBeEnergySaving;

enum toBeNotEnergySaving;

}

}

}

grouping EsNotAllowedTimePeriodGrp {

leaf startTime {

description "Start of not allowed time period in UTC time zone.

If set, the endTime must also be set. If not set, this is

interpreted as around the clock.";

must ../endTime;

type type5g3gpp:UTC24TimeOfDayT;

}

leaf endTime {

description "If endTime has a lower value than startTime, it will

be interpreted as referring to the following day.";

must ../startTime;

type type5g3gpp:UTC24TimeOfDayT;

}

leaf-list daysOfWeek {

description "Specifies that the not allowed periods are only

applicable to the specified days in UTC timezone. Every day if

not set.";

type type5g3gpp:DayOfWeekT;

}

}

grouping CESManagementFunctionSubtree {

list CESManagementFunction {

description "This IOC represents the management capabilities of

Centralized SON Energy Saving (ES) functions. This is provided for

Energy Saving purposes.

In the case where multiple CESManagement MOIs exist at different

levels of the containment tree, the CESManagement MOI at the lower

level overrides the CESManagement MOIs at higher level(s) of the

same containment tree.";

reference "clause 6.2.2 in TS 28.310";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses CESManagementFunctionGrp;

}

}

}

augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/"+

"nrcellcu3gpp:NRCellCU" {

if-feature nrcellcu3gpp:CESManagementFunction;

uses CESManagementFunctionSubtree;

}

augment /me3gpp:ManagedElement {

if-feature me3gpp:CESManagementFunction;

uses CESManagementFunctionSubtree;

}

augment /subnet3gpp:SubNetwork {

if-feature subnet3gpp:CESManagementFunction;

uses CESManagementFunctionSubtree;

}

}

<CODE ENDS>

## E.5.35 module \_3gpp-nr-nrm-operatordu.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-operatordu {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-operatordu";

prefix "operdu3gpp";

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

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-nr-nrm-gnbdufunction {prefix gnbdu3gpp; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the OperatorDU Information Object

Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-10-01 { reference "Initial revision"; }

grouping OperatorDUGrp {

description "Represents the OperatorDU IOC.";

reference "3GPP TS 28.541";

uses gnbdu3gpp:GNBDUFunctionGrp {

refine gNBId {

mandatory true;

}

refine gNBIdLength {

mandatory true;

}

list PLMNInfoList {

description "The PLMNInfoList is a list of PLMNInfo data type. It

defines which PLMNs that can be served by the NR cell, and which

S-NSSAIs that can be supported by the NR cell for corresponding PLMN

in case of network slicing feature is supported. The plMNId of the

first entry of the list is the PLMNId used to construct the nCGI for

the NR cell.";

key "mcc mnc sd sst";

min-elements 1;

ordered-by user;

uses types5g3gpp:PLMNInfo;

}

}

}

augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction" {

list OperatorDU {

description "Contains attributes to support the 5G MOCN network sharing.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses OperatorDUGrp;

}

uses gnbdu3gpp:GNBDUFunctionGrp;

}

}

}

<CODE ENDS>

## E.5.36 module \_3gpp-nr-nrm-nroperatorcelldu.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-nroperatorcelldu {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-nroperatorcelldu";

prefix "nropcelld3gpp";

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

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-nr-nrm-operatordu { prefix operdu3gpp; }

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

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

import \_3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the OperatorDU Information Object

Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-10-01 { reference "Initial revision"; }

grouping NROperatorCellDUGrp {

description "Represents the NROperatorCellDU IOC.";

reference "3GPP TS 28.541";

uses operdu3gpp:OperatorDUGrp;

leaf cellLocalId {

description "Identifies an NR cell of a gNB. Together with the

corresponding gNB identifier in forms the NR Cell Identity (NCI).";

reference "NCI in 3GPP TS 38.300";

type int32 { range "0..16383"; }

}

leaf administrativeState {

description "Administrative state of the NROperatorCellDU. Indicates the

permission to use or prohibition against using the cell, imposed

through the OAM services.";

type types3gpp:AdministrativeState;

default LOCKED;

}

list pLMNInfoList {

description "The PLMNInfoList is a list of PLMNInfo data type. It

defines which PLMNs that can be served by the NR cell, and which

S-NSSAIs that can be supported by the NR cell for corresponding PLMN

in case of network slicing feature is supported. The plMNId of the

first entry of the list is the PLMNId used to construct the nCGI for

the NR cell.";

key "mcc mnc sd sst";

min-elements 1;

ordered-by user;

uses types5g3gpp:PLMNInfo;

}

leaf nRTAC {

description "The common 5GS Tracking Area Code for the PLMNs.";

reference "3GPP TS 23.003, 3GPP TS 38.473";

type types3gpp:Tac;

}

leaf-list nRCellDURef {

description "Reference to corresponding NRCellDU instance.";

type types3gpp:DistinguishedName;

}

}

augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction/operdu3gpp:OperatorDU"

{

list NROperatorCellDU {

description "Contains attributes to support 5G MOCN network sharing.";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses NROperatorCellDUGrp;

}

uses gnbdu3gpp:GNBDUFunctionGrp;

}

}

}

<CODE ENDS>

## E.5.37 module \_3gpp-nr-nrm-dlbofunction.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-dlbofunction {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-dlbofunction";

prefix "dlbof3gpp";

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

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

import \_3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }

import \_3gpp-common-managed-element { prefix me3gpp; }

import \_3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

organization "3GPP SA5";

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

description "Defines the YANG mapping of the DLBOFunction

Information Object Class (IOC) that is part of the NR Network Resource

Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2022-03-25 { reference "CR-0683"; }

revision 2021-10-22 { reference "CR-0577"; }

feature DLBOUnderGNBCUCPFunction {

description "The DLBOFunction shall be available under

GNBCUCPFunction";

}

feature DLBOUnderManagedElement {

description "The DLBOFunction shall be available under

ManagedElement";

}

feature DLBOUnderSubNetwork {

description "The DLBOFunction shall be available under

SubNetwork";

}

grouping DLBOFunctionGrp {

description "Represents the DLBOFunction IOC.";

leaf dlboControl {

description "This attribute determines whether the LBO function is

enabled or disabled.";

type boolean;

}

leaf maximumDeviationHoTriggerLow {

description "This parameter defines the maximum allowed lower

deviation of the Handover Trigger, from the default point of

operation.";

type int32 { range "-20..20"; }

units "0.5 dB";

}

leaf maximumDeviationHoTriggerHigh {

description "This parameter defines the maximum allowed upper

deviation of the Handover Trigger, from the default point of

operation.";

type int32 { range "-20..20"; }

units "0.5 dB";

}

leaf minimumTimeBetweenHoTriggerChange {

description "This parameter defines the minimum allowed time interval

between two Handover Trigger change performed by MRO. This is used

to control the stability and convergence of the algorithm.";

type int32 { range "0..604800"; }

units "1";

}

}

grouping DLBOFunctionSubtree {

list DLBOFunction {

description "This IOC contains attributes to support the D-SON function

of LBO.

In the case where multiple DLBO MOIs exist at different levels of the

containment tree, the DLBO MOI at the lower level overrides the DLBO

MOIs at higher level(s) of the same containment tree.";

reference "clause 7.1.2 in TS 28.313";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses DLBOFunctionGrp;

}

}

}

augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/"+

"nrcellcu3gpp:NRCellCU" {

if-feature DLBOUnderGNBCUCPFunction;

uses DLBOFunctionSubtree;

}

augment /me3gpp:ManagedElement {

if-feature DLBOUnderManagedElement;

uses DLBOFunctionSubtree;

}

augment /subnet3gpp:SubNetwork {

if-feature DLBOUnderSubNetwork;

uses DLBOFunctionSubtree;

}

}

<CODE ENDS>

## E.5.38 module \_3gpp-nr-nrm-rimrsset.yang

<CODE BEGINS>

module \_3gpp-nr-nrm-rimrsset {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-nr-nrm-rimrsset";

prefix "rrsset3gpp";

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

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

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

organization "3GPP SA5";

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

description "Defines the YANG mapping of the RimRSSet Information Object

Class (IOC) that is part of the NR Network Resource Model (NRM).";

reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

revision 2021-10-28 { reference CR-0607 ; }

grouping FrequencyDomainParaGrp {

description "Configuration parameters of frequency domain resource to

support RIM RS. ";

leaf rimRSSubcarrierSpacing {

type uint8 {

range 0|1 ;

}

mandatory true;

description

"It is the subcarrier spacing configuration (u) for the RIM-RS.

Subcarrier spacing delta-f=2^u\*15 kHz. (see 38.211 subclause 5.3.3).";

}

leaf rIMRSBandwidth {

type uint8 {

range 1..96 ;

|  |
| --- |
| **End of Changes** |