**3GPP TSG-SA5 Meeting #129-e *S5-201260***

**Online, , 24th Feb 2020 - 4th Mar 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **28.541** | **CR** | **0246** | **rev** | **-** | **Current version:** | **16.3.0** |  |
|  |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **x** | Core Network |  |

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|  |
| ***Title:***  |  |
|  |  |
| ***Source to WG:*** | Huawei |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** | SON\_5G |  | ***Date:*** | 2020-02-14 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | In order to make the SON function more clear, ANR management policy IOC structure and ANR management control IOC are added.Since some attributes of ANR function belong to the gNB CU-CP, and some attributes belong to the cell. Therefore, two types of policy IOC are introducedIn addition, according to TS 38.300 subclase 15.3.3, ANR Management includes Intra-system ANR function and Inter-system ANR Function. Therefore, intra-system ANR Management Switch and inter-system ANR Management Switch are introduced. |
|  |  |
| ***Summary of change:*** | Add ANR Management policy IOC, ANR Management cell policy IOC and ANR Management control IOC structures.Add ANR Management Switch including intra-system ANR Management Switch and inter-system ANR Management Switch. |
|  |  |
| ***Consequences if not approved:*** | The function of ANR Management is not clear. |
|  |  |
| ***Clauses affected:*** | 4.3.2,4.3.32, 5.4.1, X, D.4.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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| **First of Changes** |

### 4.3.2 GNBCUCPFunction

#### 4.3.2.1 Definition

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

For 2-split NG-RAN deployment scenario, this IOC together with GNBCUUPFunction IOC provide management representation of the gNB-CU defined in clause 6.1.1 in 3GPP TS 38.401 [4].

For 3-split NG-RAN deployment scenario, this IOC provides management representation of gNB-CU-CP defined in clause 6.1.2 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\_XnC, <<IOC>>EP\_NgC, <<IOC>>EP\_F1C, <<IOC>>EP\_E1. | <<IOC>>EP\_XnC, <<IOC>>EP\_NgC, <<IOC>>EP\_F1C<<IOC>>EP\_F1U. | <<IOC>>EP\_XnC, <<IOC>>EP\_NgC. |
| en-gNB | <<IOC>>EP\_X2C, <<IOC>>EP\_F1C, <<IOC>>EP\_E1. | <<IOC>>EP\_X2C, <<IOC>>EP\_F1C. | <<IOC>>EP\_X2C. |

#### 4.3.2.2 Attributes

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| gNBId | M | T | T | F | T |
| gNBIdLength  | M  | T | T | F | T |
| gNBCUName | O | T | T | F | T |
| pLMNId | M | T | T | T | T |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

#### 4.3.2.3 Attribute constraints

None.

#### 4.3.2.4 Notifications

The common notifications defined in subclause 4.5 are valid for this IOC, without exceptions or additions.

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| **Second of Changes** |

### 4.3.32 NRCellRelation

#### 4.3.32.1 Definition

This IOC represents a neighbour cell relation from a source cell to a target cell, where the target cell is an NRCellCU or ExternalNRCellCU instance.

The source cell can be a NRCellCU instance. This is the case for an Intra-NR neighbour cell relation.

The source cell can be a EUtranGenericCell instance. This is the case for Inter-LTE-NR neighbour cell relation, from E-UTRAN to NR. See 3GPP TS 28.658 [19].

Neighbour cell relations are unidirectional.

#### 4.3.32.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| nRTCI | O | T | T | F | T |
| cellIndividualOffset | M | T | T | F | T |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **attribute related to role** |  |  |  |  |  |
| nRFreqRelationRef | M | T | T | F | T |
| adjacentNRCellRef | M | T | T | F | T |

#### 4.3.32.3 Attribute constraints

None.

#### 4.3.32.4 Notifications

The common notifications defined in subclause 4.5 are valid for this IOC, without exceptions or additions.

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| **Third of Changes** |

### 5.4.1 Attribute properties

The following table defines the attributes that are present in several Information Object Classes (IOCs) of the present document.

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| aMFIdentifier | The AMFI is constructed from an AMF Region ID, an AMF Set ID and an AMF Pointer. The AMF Region ID identifies the region, the AMF Set ID uniquely identifies the AMF Set within the AMF Region, and the AMF Pointer uniquely identifies the AMF within the AMF Set. (Ref. 3GPP TS 23.003 [13]) | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| aMFSetId | It represents the AMF Set ID, which is uniquely identifies the AMF Set within the AMF Region.allowedValues: defined in subclause 2.10.1 of 3GPP TS 23.003 [13]. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| aMFSetMemberList | It is the list of DNs of AMFFunction instances of the AMFSet. allowedValues: N/A | type: DNmultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: NoneisNullable: False |
| aMFRegionId | It represents the AMF Region ID, which identifies the region.allowedValues: defined in subclause 2.10.1 of 3GPP TS 23.003 [13]. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| localAddress  | This parameter specifies the localAddress including IP address and VLAN ID used for initialization of the underlying transport.First string is IP address, IP address can be an IPv4 address (See RFC 791 [37]) or an IPv6 address (See RFC 2373 [38]).Second string is VLAN Id (See IEEE 802.1Q [39]). | type: Stringmultiplicity: 2isOrdered: TrueisUnique: N/AdefaultValue: NoneisNullable: False |
| remoteAddress | Remote address including IP address used for initialization of the underlying transport.IP address can be an IPv4 address (See RFC 791 [37]) or an IPv6 address (See RFC 2373 [38]). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| nfProfileList | It is a set of NFProfile(s) to be registered in the NRF instance. NFProfile is defined in 3GPP TS 29.510 [23]. | type: <<dataType>>multiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| nSIIdList | It is a set of NSI Id. The NSI ID is defined in subclause 6.1.6.2.8 of 3GPP TS 29.531 [24].  | type: Stringmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| sNSSAIList | See subclause 4.4.1. |  |
| sBIFQDN | It is used to indicate the FQDN of the registered NF instance in service-based interface, for example, NF instance FQDN structure is:nftype<nfnum>.slicetype<sliceid>.mnc<MNC>.mcc<MCC>.3gppnetwork.org | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| sBIServiceList | It is used to indicate the all supported NF services registered on service-based interface. | type: Stringmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| nRTACList | It is the list of Tracking Area Codes (either legacy TAC or extended TAC). allowedValues:Legacy TAC and Extended TAC are defined in clause 9.3.3.10 of TS 38.413 [5]. | type: Integermultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| supportedBMOList | It is used to indicate the list of supported BMOs (Bridge Managed Objects) required for integration with TSN system. | type: Stringmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| managedNFProfile | This parameter defines profile for managed NF (See TS 23.501 [22]). allowedValues: N/A | type: ManagedNFProfilemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| nfInstanceID | This parameter defines unique identity of the NF Instance. The format of the NF Instance ID shall be a Universally Unique Identifier (UUID) version 4, as described in IETF RFC 4122 [44]allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: FisUnique: N/AdefaultValue: NoneisNullable: False |
| nfType | This parameter defines type of Network FunctionallowedValues: See TS 23.501[22] for NF types | type: ENUMmultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| fqdn | This parameter defines FQDN of the Network Function (See TS 23.003 [5])allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: FisUnique: N/AdefaultValue: NoneisNullable: False |
| ipAddress | This parameter defines IP Address of the Network Function. It can be IPv4 address (See RFC 791 [24]) or IPv6 address (See RFC 2373 [25]).allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: FisUnique: N/AdefaultValue: NoneisNullable: False |
| authzInfo | This parameter defines NF Specific Service authorization information. It shall include the NF type (s) and NF realms/origins allowed to consume NF Service(s) of NF Service Producer (See TS 23.501[22]). allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: FisUnique: N/AdefaultValue: NoneisNullable: True |
| locality | The parameter defines information about the location of the NF instance (e.g. geographic location, data center) defined by operator (See TS 29.510[23]).allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: FisUnique: N/AdefaultValue: NoneisNullable: True |
| capacity | This parameter defines static capacity information in the range of 0-65535, expressed as a weight relative to other NF instances of the same type; if capacity is also present in the nfServiceList parameters, those will have precedence over this value (See TS 29.510[23])allowedValues: 0-65535 | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| nFInfo | This parameter includes NF specific data in Managed NF profileallowedValues: N/A | type: NFInfomultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| hostAddr | This parameter defines host address of a NFallowedValues: N/A | type: HostAddrmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| priority | This parameter defines Priority (relative to other NFs of the same type) in the range of 0-65535, to be used for NF selection; lower values indicate a higher priority. If priority is also present in the nfServiceList parameters, those will have precedence over this value (See TS 29.510[23]).allowedValues: 0-65535 | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| supportedDataSetIds | This parameter defines list of supported data sets in the UDR instance (See TS 29.510[23]).allowedValues: "SUBSCRIPTION", "POLICY", EXPOSURE", "APPLICATION" | type: ENUMmultiplicity: 1..\*isOrdered: N/AisUnique: FalsedefaultValue: NoneisNullable: False |
| nFSrvGroupId | This parameter defines identity of the group that is served by the NF instance (See TS 29.510[23]).allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: FisUnique: N/AdefaultValue: NoneisNullable: False |
| smfServingAreas | This parameter defines the SMF service area(s) the UPF can serve (See TS 29.510[23]).allowedValues: N/A | type: Stringmultiplicity: 1..\*isOrdered: FisUnique: TruedefaultValue: NoneisNullable: False |
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| groupId | This parameter identiies a list of target NF services on which the same communication model is applied to. allowedValues: N/A | type: Integermultiplicity: 1isOrdered: N/AisUnique: FalsedefaultValue: NoneisNullable: False |
| commModelType | This parameter defines communication model used by a NF to interact with NF service(s) (See TS 23.501 [2]). allowedValues:”DIRECT\_COMMUNICATION\_WO\_NRF”, “DIRECT\_COMMUNICATION\_WITH\_NRF”, “INDIRECT\_COMMUNICATION\_WO\_DEDICATED\_DISCOVERY”, “INDIRECT\_COMMUNICATION\_WITH\_DEDICATED\_DISCOVERY” | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| targetNFServiceList | This parameter lists target NF services sharing same communication model and configuration.allowedValues: N/A | type: DNmultiplicity: 1..\*isOrdered: FisUnique: N/AdefaultValue: NoneisNullable: False |
| commModelConfiguration | This parameter defines configuration parameters for specific communication model for a group of NF Services.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| supportedFuncList | This parameter lists functionalities supported by a SCP. Refer to TS 23.501 [2]. | type: SupportedFunctionmultiplicity: 1..\*isOrdered: N/AisUnique: FalsedefaultValue: NoneisNullable: False |
| address | This parameter defines address of a SCP instance, it can be IP address (either IPv4 address (See RFC 791 [24]) or IPv6 address (See RFC 2373 [25])) or FQDN (See TS 23.003 [5]).  | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| function | This parameter defines name of a functionality supported by a SCP. | type: Stringmultiplicity: 1isOrdered: FisUnique: N/AdefaultValue: NoneisNullable: False |
| policy | This parameter defines configuration policies of a functionality supported by a SCP. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| capabilityList | This parameter lists capabilities supported by a NEF. Refer to TS 23.501 [2].allowedValues: N/A | type: Stringmultiplicity: 1..\*isOrdered: N/AisUnique: FalsedefaultValue: NoneisNullable: False |
| isINEF | This parameter defines if the NEF is an Intermediate NEF. allowedValues: TRUE, FALSE | type: Booleanmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| isCAPIFSup | This parameter defines if the NEF support Common API Framework.allowedValues: TRUE, FALSE | type: Booleanmultiplicity: 1isOrdered: FisUnique: N/AdefaultValue: NoneisNullable: False |
| sEPPType | This parameter defines the type of a SEPP entity. Refer to TS 33.501 [52].allowedValues: “CSEPP”, “PSEPP” | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: FalsedefaultValue: NoneisNullable: False |
| sEPPId | This parameter is identifier of a SEPP, it is unique inside a PLMN. allowedValues: N/A | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| remotePlmnId | This parameter defines PLMNId of the remote SEPP.allowedValues: N/A | Type: PLMNId multiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| remoteSeppAddress | This parameter defines address of the remote SEPP. It can be IP address (either IPv4 address (See RFC 791 [24]) or IPv6 address (See RFC 2373 [25])) or FQDN(See TS 23.003 [5]).allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: FisUnique: N/AdefaultValue: NoneisNullable: False |
| remoteSeppId | This parameter defines identifier of the remote SEPP. it is unique inside a PLMN.allowedValues: N/A | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| n32cParas | This attribute is used to configure parameters to establish security link between two SEPPs. allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: FisUnique: N/AdefaultValue: NoneisNullable: False |
| n32fPolicy | This attribute is used to configure policies to protect the messages exchanged between SEPPs.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: FisUnique: N/AdefaultValue: NoneisNullable: False |
| withIPX | This attribute defines if there’s an IPX interconnected between two SEPPs.allowedValues: TRUE, FALSE | type: Booleanmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |

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| **Fourth of Changes** |

# X NRM Fragement for SON

## X.1 NRM fragement for ANR

### X.1.1 Class diagram

#### X.1.1.1 Relationships

This clause depicts the set of classes (e.g. IOCs) that encapsulates the information relevant for ANR management.



Figure X.1.2.1.1: NRM fragement for ANR Management

#### X.1.1.2 Inheritance



Figure X.1.2.2.1: Inheritance Hierarchy

### X.1.2 Class definitions

#### X.1.2.1 ANRManagementFunction

##### X.1.2.1.1 Definition

This <<IOC>> contains attributes to support the D-SON function of ANR Management (See clause 7.1.4 in TS 28.313 [x]).

##### X.1.2.1.2 Attributes

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| x2BlackList | CM | T | T | F | T |
| x2WhiteList | CM | T | T | F | T |
| xnBlackList | M | T | T | F | T |
| xnWhiteList | M | T | T | F | T |
| x2XnHOBlackList | M | T | T | F | T |
| intrasystemANRManagementSwitch | M | T | T | F | T |
| intersystemANRManagementSwitch | M | T | T | F | T |
| aNRManagementCellPolicyList | M | T | T | F | T |

##### X.1.2.1.3 Attribute constraints

|  |  |
| --- | --- |
| Name | Definition |
| x2BlackList | Condition: Multi-Radio Dual Connectivity with the EPC (see TS 37.340 [9] clause 4.1.2) is supported. |
| x2WhiteList | Condition: Multi-Radio Dual Connectivity with the EPC (see TS 37.340 [9] clause 4.1.2) is supported. |

##### X.1.2.1.4 Notifications

The common notifications defined in subclause X.1.5 are valid for this IOC, without exceptions or additions.

#### X.1.2.2 ANRManagementCellPolicy <data type>

##### X.1.2.2.1 Definition

This data type represents the cell policy information of ANR management.

##### X.1.2.2.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| NRCellRelationRef | M | T | T | F | F |
| isRemoveAllowed | M | T | T | F | T |
| isHOAllowed | M | T | T | F | T |

##### X.1.2.2.3 Attribute constraints

None.

##### X.1.2.2.4 Notifications

The subclause X.1.4 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

|  |  |  |  |  |  |
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### X.1.3 Attributes definition

|  |  |  |
| --- | --- | --- |
| Attribute Name | Documentation and Allowed Values | Properties |
| isRemoveAllowed | This indicates if the subject NRCellRelation can be removed (deleted) or not. If YES, the subject NRCellRelation instance can be removed (deleted). If NO, the subject NRCellRelation instance shall not be removed (deleted) by any entity but an MnS consumer.allowedValues: YES, NO | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| isHOAllowed | This indicates if HO is allowed or prohibited.If YES, handover is allowed from source cell to target cell. The source cell is identified by the name-containing NRCellCU of the NRCellRelation that contains the isHOAllowed. The target cell is referenced by the NRCellRelation that contains this isHOAllowed. If NO, handover shall not be allowed.allowedValues: YES, NO | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| x2BlackList | This is a list of DNs of NRCellCU and ExternalNRCellCU. If the target node DN is a member of the source node’s NRCellCU.x2BlackList, the source node is: 1) Prohibited from sending X2 connection request to target node;2) Forced to tear down established X2 connection to target node 3) Not allowed to accept incoming X2 connection request from target node.The same DN may appear here and in NRCellCU.x2WhiteList. In such case, the DN in x2WhiteList shall be treated as if it is absent. | type: DNmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| xnBlackList | This is a list of DNs of NRCellCU and ExternalNRCellCU. If the target node DN is a member of the source node’s NRCellCU.xnBlackList, the source node is: 1) Prohibited from sending Xn connection request to target node;2) Forced to tear down established Xn connection to target node 3) Not allowed to accept incoming Xn connection request from target node.The same DN may appear here and in NRCellCU.xnWhiteList. In such case, the DN in xnWhiteList shall be treated as if it is absent. | type: DNmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| x2WhiteList | This is a list of DNs of NRCellCU and ExternalNRCellCU. If the target node DN is a member of the source node’s NRCellCU.x2WhiteList, the source node:- is allowed to request the establishment of X2 connection with the target node;- is not allowed to initiate the tear down of established X2 connection to target nodeThe same DN may appear here and in NRCellCU.x2BlackList. In such case, the DN here shall be treated as if it is absent. | type: Stringmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| xnWhiteList | This is a list of DNs of NRCellCU and ExternalNRCellCU. If the target node DN is a member of the source node’s NRCellCU.x2WhiteList, the source node:- is allowed to request the establishment of X2 connection with the target node;- is not allowed to initiate the tear down of established X2 connection to target nodeThe same DN may appear here and in NRCellCU.x2BlackList. In such case, the DN here shall be treated as if it is absent. | type: Stringmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| x2XnHOBlackList | This is a list of DNs of any number and combination of cells represented by the following IoCs:NRCellCUExternalNRCellCU. ExternalEUtranCellTDDExternalEUtranCellFDDEUtranCellTDDEUtranCellFDDFor all the entries in NRCellCU.x2XnHOBlackList, the subject NRCellCU is prohibited to use the X2 or Xn interface for HOs even if an X2 or Xn interface exists to the target cell. | type: DNmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| intrasystemANRManagementSwitch | This attribute determines whether the intra-system ANR function is activated or deactivated.If “on”, the intra-system ANR function may add or remove intra NG-RAN Neighbour Relations, i.e. add or remove NRCellRelation instances from NRCellCU of this GNBCUCPFunction.If “off”, the intra-system ANR Function must not add or remove Neighbour Relations, i.e. add or remove NRCellRelation instances from NRCellCU of this GNBCUCPFunction.allowedValues: On, Off | type: enumerationmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| intersystemANRManagementSwitch | This attribute determines whether the inter-system ANR function is activated or deactivated.If “on”, the inter-system ANR function may add or remove inter-system Neighbour Relations, i.e. add or remove EUtranRelation instances from NRCellCU of this GNBCUCPFunction.If “off”, the inter-system ANR Function must not add or remove inter-system Neighbour Relations, i.e. add or remove EUtranRelation instances from NRCellCU of this GNBCUCPFunction.allowedValues: On, Off | type: enumerationmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| aNRManagementCellPolicyList | This attribute specifies the cell policy information of ANR management. | type: aNRManagementCellPolicymultiplicity: 1..\*isOrdered: N/AisUnique: N/AdefaultValue: NoneallowedValues: N/AisNullable: False |
| NRCellRelationRef | This attribute contains the DN of the referenced NRCellRelation.allowedValues: Not applicable. | type: DNmultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: NoneisNullable: False |

### X.1.4 Common notifications

This subclause presents a list of notifications, defined in [35], that provisioning management service consumer can receive. The notification parameter objectClass/objectInstance, defined in [26], would capture the DN of an instance of an IOC defined in the present document.

| Name | Qualifier | Notes |
| --- | --- | --- |
| notifyMOIAttributeValueChanges | O |  |
| notifyMOICreation | O |  |
| notifyMOIDeletion | O |  |

|  |
| --- |
| **Fifth of Changes** |

## D.4.3 JSON schema "nrNrm.json"

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 "openapi": "3.0.1",

 "info": {

 "title": "3GPP NR NRM",

 "version": "16.1.0",

 "description": "OAS 3.0.1 specification compatible schema for 3GPP NR NRM"

 },

 "paths": {},

 "components": {

 "schemas": {

 "GnbId": {

 "type": "string"

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 "GnbIdLength": {

 "type": "integer",

 "minimum": 22,

 "maximum": 32

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 "GnbName": {

 "type": "string",

 "maxLength": 150

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 "GnbDuId": {

 "type": "number",

 "minimum": 0,

 "maximum": 68719476735

 },

 "GnbCuUpId": {

 "type": "number",

 "minimum": 0,

 "maximum": 68719476735

 },

 "NCi": {

 "type": "object",

 "properties": {

 "plmnId": {

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

 },

 "nCI": {

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

 }

 }

 },

 "SnssaiList": {

 "type": "array",

 "items": {

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

 }

 },

 "RrmPolicy": {

 "type": "string"

 },

 "NrPci": {

 "type": "integer",

 "maximum": 503

 },

 "NrTac": {

 "type": "integer",

 "maximum": 16777215

 },

 "NrCellId": {

 "type": "integer",

 "maximum": 68719476735

 },

 "Sst": {

 "type": "integer",

 "maximum": 255

 },

 "Snssai": {

 "type": "object",

 "properties": {

 "sst": {

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

 },

 "sd": {

 "type": "string"

 }

 }

 },

 "CellState": {

 "type": "string",

 "enum": [

 "IDLE",

 "INACTIVE",

 "ACTIVE"

 ]

 },

 "CyclicPrefix": {

 "type": "string",

 "enum": [

 "15",

 "30",

 "60",

 "120"

 ]

 },

 "TxDirection": {

 "type": "string",

 "enum": [

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 "UL",

 "DL and UL"

 ]

 },

 "BwpContext": {

 "type": "string",

 "enum": [

 "DL",

 "UL",

 "SUL"

 ]

 },

 "IsInitialBwp": {

 "type": "string",

 "enum": [

 "INITIAL",

 "OTHER",

 "SUL"

 ]

 },

 "QuotaType": {

 "type": "string",

 "enum": [

 "STRICT",

 "FLOAT"

 ]

 },

 "RrmPolicyRatio2": {

 "type": "object",

 "properties": {

 "groupId": {

 "type": "integer"

 },

 "sNSSAIList": {

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

 },

 "quotaType": {

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

 },

 "rRMPolicyMaxRation": {

 "type": "integer"

 },

 "rRMPolicyMarginMaxRation": {

 "type": "integer"

 },

 "rRMPolicyMinRation": {

 "type": "integer"

 },

 "rRMPolicyMarginMinRation": {

 "type": "integer"

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 },

 "Mnc": {

 "type": "string",

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

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 "mnc": {

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

 }

 }

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 "PlmnIdList": {

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 "items": {

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

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 },

 "LocalAddress": {

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 "properties": {

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 },

 "ipv6Address": {

 "$ref": "genericNrm.json#/components/schemas/Ipv6Addr"

 },

 "vlanId": {

 "type": "integer",

 "minimum": 0,

 "maximum": 4096

 },

 "port": {

 "type": "integer",

 "minimum": 0,

 "maximum": 65535

 }

 }

 },

 "RemoteAddress": {

 "type": "object",

 "properties": {

 "ipv4Address": {

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 "ipv6Address": {

 "$ref": "genericNrm.json#/components/schemas/Ipv6Addr"

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 "CellIndividualOffset": {

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 "type": "integer"

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 "rsrqOffsetSSB": {

 "type": "integer"

 },

 "sinrOffsetSSB": {

 "type": "integer"

 },

 "rsrpOffsetCSI-RS": {

 "type": "integer"

 },

 "rsrqOffsetCSI-RS": {

 "type": "integer"

 },

 "sinrOffsetCSI-RS": {

 "type": "integer"

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 "QOffsetRange": {

 "type": "integer",

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 -22,

 -20,

 -18,

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 -8,

 -6,

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 -3,

 -2,

 -1,

 0,

 24,

 22,

 20,

 18,

 16,

 14,

 12,

 10,

 8,

 6,

 5,

 4,

 3,

 2,

 1

 ]

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 "QOffsetRangeList": {

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 "rsrqOffsetSSB": {

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 "sinrOffsetSSB": {

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

 },

 "rsrpOffsetCSI-RS": {

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

 },

 "rsrqOffsetCSI-RS": {

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

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 "sinrOffsetCSI-RS": {

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 }

 }

 },

 "QOffsetFreq": {

 "type": "number"

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 "TReselectionNRSf": {

 "type": "integer",

 "enum": [

 25,

 50,

 75,

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 },

 "SsbPeriodicity": {

 "type": "integer",

 "enum": [

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 10,

 20,

 40,

 80,

 160

 ]

 },

 "SsbDuration": {

 "type": "integer",

 "enum": [

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 2,

 3,

 4,

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 },

 "SsbSubCarrierSpacing": {

 "type": "integer",

 "enum": [

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 30,

 120,

 240

 ]

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 "coverageShape": {

 "type": "integer",

 "maximum": 65535

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 "digitalTilt": {

 "type": "integer",

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 "digitalAzimuth": {

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 "gnbDuName": {

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 "gnbId": {

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

 },

 "gnbIdLength": {

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 "$ref": "#/components/schemas/EP\_F1C"

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 "EP\_F1U": {

 "type": "array",

 "items": {

 "$ref": "#/components/schemas/EP\_F1U"

 }

 },

 "NrCellDu": {

 "type": "array",

 "items": {

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

 }

 },

 "NrSectorCarrier": {

 "type": "array",

 "items": {

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

 }

 },

 "Bwp": {

 "type": "array",

 "items": {

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

 }

 },

 "CommonBeamformingFunction": {

 "type": "array",

 "items": {

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

 }

 },

 "Beam": {

 "type": "array",

 "items": {

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

 }

 }

 }

 }

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

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 "gnbCuName": {

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

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 "plmnId": {

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

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 "EP\_XnC": {

 "type": "array",

 "items": {

 "$ref": "#/components/schemas/EP\_XnC"

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 "EP\_X2C": {

 "type": "array",

 "items": {

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 }

 },

 "EP\_NgC": {

 "type": "array",

 "items": {

 "$ref": "#/components/schemas/EP\_NgC"

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 "NrCellCu": {

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 ]

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 "GnbCuUpFunction": {

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 "properties": {

 "attributes": {

 "allOf": [

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 "$ref": "genericNrm.json#/components/schemas/ManagedFunction-Attributes"

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 "properties": {

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

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 "gnbIdLength": {

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

 },

 "gnbCuUpId": {

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

 },

 "plmnIdList": {

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

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 "EP\_XnU": {

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 "items": {

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 "EP\_NgU": {

 "type": "array",

 "items": {

 "$ref": "#/components/schemas/EP\_NgU"

 }

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 "EP\_X2U": {

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 "EP\_S1U": {

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 "$ref": "#/components/schemas/EP\_S1U"

 }

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 }

 }

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 "attributes": {

 "allOf": [

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 "snssaiList": {

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

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 "rrmPolicyType": {

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 },

 "rrmPolicyRatio2": {

 "$ref": "#/components/schemas/RrmPolicyRatio2"

 },

 "nRFrequencyRef": {

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 }

 }

 }

 ]

 }

 }

 },

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 },

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 "NRFreqRelation": {

 "type": "array",

 "items": {

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

 }

 },

 "EUtranCellRelation": {

 "type": "array",

 "items": {

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

 }

 },

 "EUtranFreqRelation": {

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 "items": {

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

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 }

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 "plmnIdList": {

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 },

 "nrTac": {

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

 },

 "arfcnDL": {

 "type": "integer"

 },

 "arfcnUL": {

 "type": "integer"

 },

 "arfcnSUL": {

 "type": "integer"

 },

 "bSChannelBwDL": {

 "type": "integer"

 },

 "bSChannelBwUL": {

 "type": "integer"

 },

 "bSChannelBwSUL": {

 "type": "integer"

 },

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 "ssbSubCarrierSpacing": {

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

 },

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 },

 "bwpRef": {

 "type": "array",

 "items": {

 "$ref": "genericNrm.json#/components/schemas/Dn"

 }

 },

 "nRFrequencyRef": {

 "$ref": "genericNrm.json#/components/schemas/Dn"

 }

 }

 }

 ]

 }

 }

 },

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 }

 ]

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 "properties": {

 "attributes": {

 "allOf": [

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 },

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 "properties": {

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

 },

 "configuredMaxTxPower": {

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 "arfcnUL": {

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 "bSChannelBwDL": {

 "type": "integer"

 },

 "bSChannelBwUL": {

 "type": "integer"

 },

 "sectorEquipmentFunctionRef": {

 "$ref": "genericNrm.json#/components/schemas/Dn"

 }

 }

 }

 ]

 }

 }

 },

 {

 "$ref": "genericNrm.json#/components/schemas/ManagedFunction-ContainingObjects"

 }

 ]

 },

 "Bwp": {

 "allOf": [

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 },

 {

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 "properties": {

 "attributes": {

 "allOf": [

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 "$ref": "genericNrm.json#/components/schemas/ManagedFunction-Attributes"

 },

 {

 "type": "object",

 "properties": {

 "bwpContext": {

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

 },

 "isInitialBwp": {

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

 },

 "subCarrierSpacing": {

 "type": "integer"

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 "cyclicPrefix": {

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

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 "startRB": {

 "type": "integer"

 },

 "numberOfRBs": {

 "type": "integer"

 }

 }

 }

 ]

 }

 }

 },

 {

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 }

 ]

 },

 "CommonBeamformingFunction": {

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 "properties": {

 "attributes": {

 "allOf": [

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 "properties": {

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 },

 "digitalAzimuth": {

 "type": "#/components/schemas/digitalAzimuth"

 },

 "digitalTilt": {

 "type": "#/components/schemas/digitalTilt"

 }

 }

 }

 ]

 }

 }

 },

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 "$ref": "genericNrm.json#/components/schemas/ManagedFunction-ContainingObjects"

 }

 ]

 },

 "Beam": {

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 "properties": {

 "attributes": {

 "allOf": [

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 "properties": {

 "beamIndex": {

 "type": "integer"

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 "beamType": {

 "type": "string",

 "enum": [

 "SSB-BEAM"

 ]

 },

 "beamAzimuth": {

 "type": "integer",

 "minimum": -1800,

 "maximum": 1800

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 "beamTilt": {

 "type": "integer",

 "minimum": -900,

 "maximum": 900

 },

 "beamHorizWidth": {

 "type": "integer",

 "minimum": 0,

 "maximum": 3599

 },

 "beamVertWidth": {

 "type": "integer",

 "minimum": 0,

 "maximum": 1800

 }

 }

 }

 ]

 }

 }

 }

 ]

 },

 "ExternalGnbDuFunction": {

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 },

 {

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 "properties": {

 "attributes": {

 "allOf": [

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 },

 "gnbIdLength": {

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

 }

 }

 }

 ]

 }

 }

 },

 {

 "$ref": "genericNrm.json#/components/schemas/ManagedFunction-ContainingObjects"

 },

 {

 "type": "object",

 "properties": {

 "EP\_F1C": {

 "type": "array",

 "items": {

 "$ref": "#/components/schemas/EP\_F1C"

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 "EP\_F1U": {

 "type": "array",

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 }

 }

 }

 }

 ]

 },

 "ExternalGnbCuCpFunction": {

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 "gnbIdLength": {

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 },

 "plmnId": {

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

 }

 }

 }

 ]

 }

 }

 },

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 "items": {

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 "EP\_F1C": {

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 "items": {

 "$ref": "#/components/schemas/EP\_F1C"

 }

 },

 "EP\_E1": {

 "type": "array",

 "items": {

 "$ref": "#/components/schemas/EP\_E1"

 }

 },

 "EP\_XnC": {

 "type": "array",

 "items": {

 "$ref": "#/components/schemas/EP\_XnC"

 }

 }

 }

 }

 ]

 },

 "ExternalGnbCuUpFunction": {

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 "properties": {

 "attributes": {

 "allOf": [

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 "properties": {

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| **End of Changes** |