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Contents

Foreword

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Introduction

The present document is part of a TS-family covering the 3rd Generation Partnership Project Technical Specification Group Services and System Aspects Management and orchestration of networks, as identified below:

TS 28.540: Management and orchestration of 5G networks; Network Resource Model (NRM); Stage 1.

TS 28.541: Management and orchestration of 5G networks; Network Resource Model (NRM); Stage 2 and stage 3.

1 Scope

The present document specifies the Information Model and Solution Set for the Network Resource Model (NRM) definitions of NR, NG-RAN, 5G Core Network (5GC) and network slice, to fulfil the requirements identified in 3GPP TS 28.540 [10].

The Information Model defines the semantics and behaviour of information object class attributes and relations visible on the management interfaces in a protocol and technology neutral way. And Solution Set defines one or more solution set(s) with specific protocol(s) according to the Information Model definitions.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.501: "System Architecture for the 5G System".

[3] 3GPP TS 38.300: "NR; Overall description; Stage-2".

[4] 3GPP TS 38.401: "NG-RAN; Architecture description".

[5] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)".

[6] 3GPP TS 38.420: "NG-RAN; Xn general aspects and principles".

[7] 3GPP TS 38.470: "NG-RAN; F1 general aspects and principles".

[8] 3GPP TS 38.473: "NG-RAN; F1 application protocol (F1AP)".

[9] 3GPP TS 37.340: "NR; Multi-connectivity; Overall description; Stage 2".

[10] 3GPP TS 28.540: "Management and orchestration; 5G Network Resource Model (NRM);Stage 1".

[11] 3GPP TS 28.662: "Telecommunication management; Generic Radio Access Network (RAN) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS) ".

[12] 3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".

[13] 3GPP TS 23.003: "Numbering, Addressing and Identification".

[14] 3GPP TS 36.410: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 general aspects and principles".

[15] 3GPP TS 36.423: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 application protocol".

[16] 3GPP TS 36.425: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 interface user plane protocol".

[17] 3GPP TS 28.625: "State Management Data Definition Integration Reference Point (IRP); Information Service (IS)".

[18] ITU-T Recommendation X.731: "Information technology - Open Systems Interconnection - Systems Management: State management function".

[19] 3GPP TS 28.658: "Telecommunications management; Evolved Universal Terrestrial Radio Access Network (E-UTRAN) Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS)".

[20] 3GPP TS 28.702: "Core Network (CN) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[21] 3GPP TS 28.708: "Telecommunication management; Evolved Packet Core (EPC) Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS)".

[22] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".

[23] 3GPP TS 29.510: "5G system; Network Function Repository Services; Stage 3".

[24] 3GPP TS 29.531: "5G System; Network Slice Selection Services Stage 3".

[25] Void.

[26] 3GPP TS 28.531: "Management and orchestration; Provisioning".

[27] 3GPP TS 28.554: "Management and orchestration; 5G End to end Key Performance Indicators (KPI)".

[28] 3GPP TS 22.261: "Service requirements for next generation new services and markets".

[29] ETSI GS NFV-IFA 013 V2.4.1 (2018-02) "Network Function Virtualisation (NFV); Management and Orchestration; Os-Ma-nfvo Reference Point - Interface and Information Model Specification".

[30] 3GPP TS 28.622: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[31] Void.

[32] 3GPP TS 38.211: "NR; Physical channels and modulation".

[33] 3GPP TS 32.616: "Telecommunication management; Configuration Management (CM); Bulk CM Integration Reference Point (IRP); Solution Set (SS) definitions".

[34] 3GPP TS 28.623: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions".

[35] 3GPP TS 28.532: "Management and orchestration; Management services".

[36] Void.

[37] IETF RFC 791: "Internet Protocol".

[38] IETF RFC 2373: "IP Version 6 Addressing Architecture".

[39] IEEE 802.1Q: "Media Access Control Bridges and Virtual Bridged Local Area Networks".

[40] ETSI GR NFV-IFA 015 (V2.4.1): "Network Function Virtualisation (NFV) Release 2; Management and Orchestration; Report on NFV Information Model".

[41] 3GPP TS 38.213: "NR; Physical layer procedures for control".

[42] 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".

[43] 3GPP TS 32.156: "Telecommunication management; Fixed Mobile Convergence (FMC) model repertoire".

[44] IETF RFC 4122: "A Universally Unique IDentifier (UUID) URN Namespace".

[45] IETF RFC 8528: "YANG Schema Mount".

[46] Void

[47] 3GPP TS 32.160: "Management and orchestration; Management Service Template".

[48] 3GPP TS 38.463: "NG-RAN; E1 application protocol (E1AP)".

[49] 3GPP TS 38.304: "NR; User Equipment (UE) procedures in Idle mode and RRC Inactive state".

[50] GSMA NG.116 - Generic Network Slice Template Version 2.0 (2019-10-16).

[51] 3GPP TS 22.104: "Service requirements for cyber-physical control applications in vertical domains; Stage 1".

[52] 3GPP TS 33.501: " Security architecture and procedures for the 5G System".

[53] 3GPP TS 38.901: "Study on channel model for frequencies from 0.5 to 100 GHz ".

[54] 3GPP TS 38.331: "NR; Radio Resource Control (RRC) protocol specification".

[55] 3GPP TS 38.215: "NR; Physical layer measurements".

[56] 3GPP TS 29.244: "Technical Specification Group Core Network and Terminals; Interface between the Control Plane and the User Plane Nodes; Stage 3".

[57] 3GPP TS 28.313: "Self-Organizing Networks (SON) for 5G networks".

[58] 3GPP TS 38.423: "NR; Xn application protocol (XnAP)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1], 3GPP TS 28.540 [10] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1] and 3GPP TS 28.540 [10].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1], 3GPP TS 23.501 [2], 3GPP TS 38.401 [4], 3GPP TS 28.540 [10] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1] , 3GPP TS 23.501 [2], 3GPP TS 38.401 [4] and 3GPP TS 28.540 [10].

BWP	Bandwidth part
CM	Configuration Management
DN	Distinguished Name
IOC	Information Object Class
JSON	JavaScript Object Notation
NFV	Network Functions Virtualisation
NRM	Network Resource Model
NS	Network Service
NSI	Network Slice Instance
NSSAI	Network Slice Selection Assistance Information
NSSI	Network Slice Subnet Instance
PNF	Physical Network Function
RIM	Remote interference management
RIM-RS	Remote interference management reference signal
SBA	Service Based Architecture
SS	Solution Set

TN Transport Network
VNF Virtualised Network Function

4 Information model definitions for NR NRM

4.1 Imported and associated information

4.1.1 Imported information entities and local labels

Label reference	Local label
TS 28.622 [30], IOC, ManagedFunction	ManagedFunction
TS 28.622 [30], IOC, EP_RP	EP_RP
TS 28.662 [11], IOC, SectorEquipmentFunction	SectorEquipmentFunction
TS 28.658 [19], IOC, ExternalENBFunction	ExternalENBFunction
TS 28.708 [21], IOC, ServingGWFunction	ServingGWFunction
TS 28.658 [19], IOC, EUtranCellFDD	EUtranCellFDD
TS 28.658 [19], IOC, EUtranCellTDD	EUtranCellTDD
TS 28.658 [19], dataType, PLMNId	PLMNId
TS 28.658 [19], IOC, ENBFunction	ENBFunction
TS 28.708 [21], IOC, ExternalServingGWFunction	ExternalServingGWFunction
TS 28.658 [19], IOC, ExternalEUtranCellFDD	ExternalEUtranCellFDD
TS 28.658 [19], IOC, ExternalEUtranCellTDD	ExternalEUtranCellTDD
TS 28.658 [19], IOC, AdjacentCell	AdjacentEUtranCell
TS 28.658 [19], IOC, EUtranFrequency	EUtranFrequency
TS 28.658 [19], IOC, EUtranFreqRelation	EUtranFreqRelation
TS 28.658 [19], IOC, EUtranRelation	EUtranCellRelation

4.1.2 Associated information entities and local labels

Label reference	Local label
TS 28.622 [30], IOC, ManagedElement	ManagedElement
TS 28.622 [30], IOC, SubNetwork	SubNetwork

4.2 Class diagram

4.2.1 Class diagram for gNB and en-gNB

4.2.1.1 Relationships

This clause depicts the set of classes (e.g. IOCs) that encapsulates the information relevant for this gNB and en-gNB. For the UML semantics, see 3GPP TS 32.156 [43]. Subsequent clauses provide more detailed specification of various aspects of these classes.

The model fragments are for management representation of gNB and en-gNB for all NG-RAN deployment scenario as listed below.

- Non-split NG-RAN deployment scenario, represents the gNB defined in TS 38.401[4]. In this scenario, a gNB is represented by a combination of a GNBCUCPFunction, one or more GNBCUUPFunctions and one or more GNBDUFunctions.

- 2-split NG-RAN deployment scenario, represents the gNB consist of gNB-CU and gNB-DU defined in TS 38.401[4] clause 6.1.1. In this scenario, a gNB-CU is represented by a combination of a GNBCUCPFunction and one or more GNBCUUPFunctions, whereas a gNB-DU is represented by a GNBDUFunction.

- 3-split NG-RAN deployment scenario, represents the gNB consist of gNB-CU-CP, gNB-CU-UP and gNB-DU defined in TS 38.401[4] clause 6.1.2. In this scenario, a gNB-CU-CP is represented by a GNBCUCPFunction, a gNB-CU-UP is represented by a GNBCUUPFunction, and a gNB-DU is represented by a GNBDUFunction.

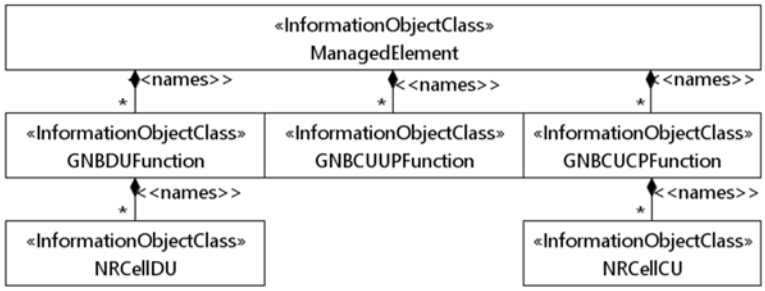


Figure 4.2.1.1-1: NRM for all deployment scenarios

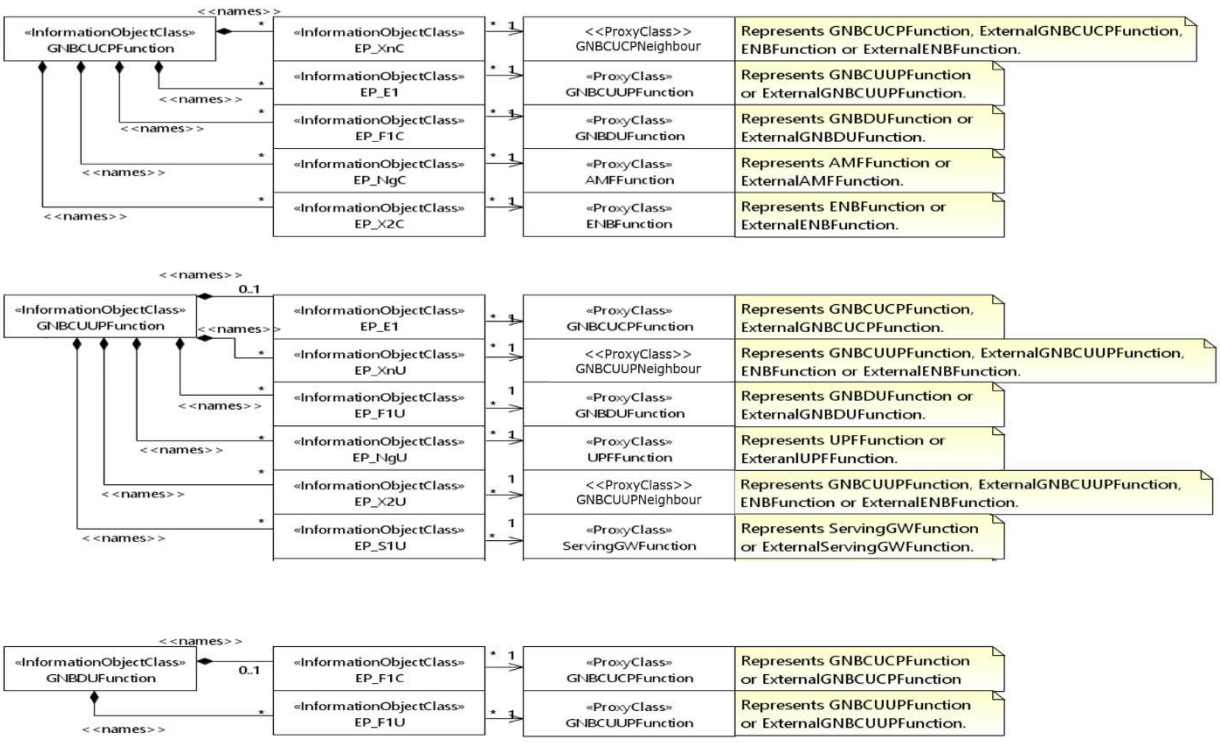


Figure 4.2.1.1-2: NRM for EPs for all deployment scenarios

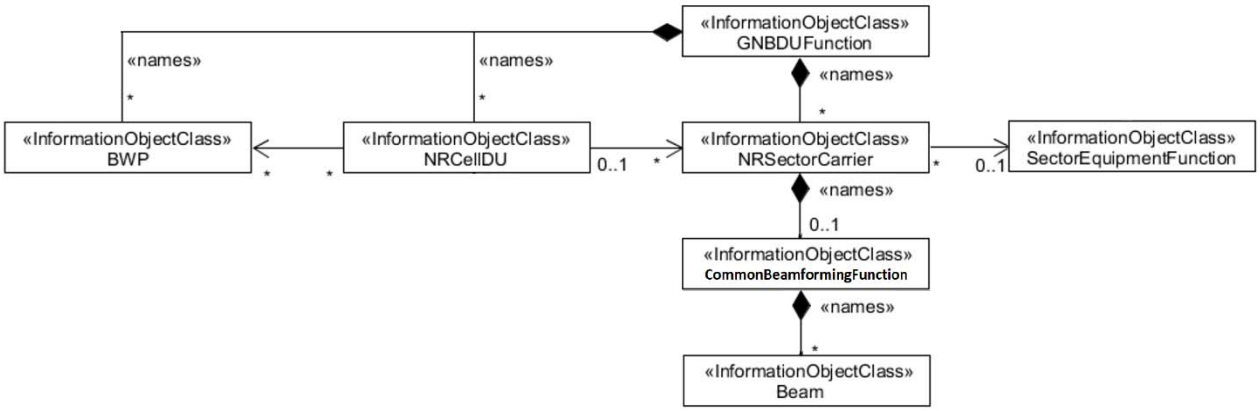


Figure 4.2.1.1-3: NRM for <<IOC>>`NRSectorCarrier` and <<IOC>>`BWP` for all deployment scenarios

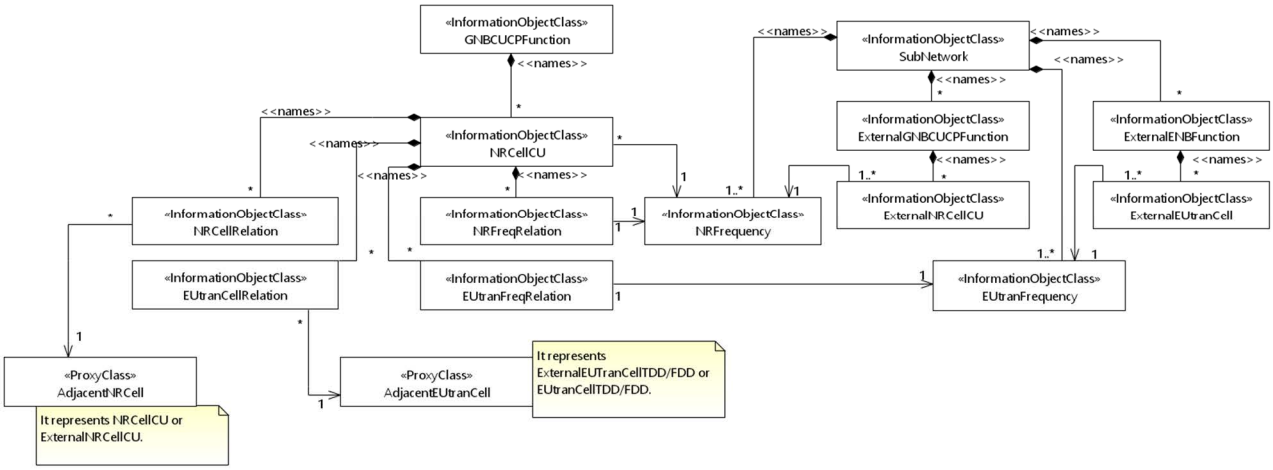


Figure 4.2.1.1-4: Cell Relation view for all deployment scenarios

NOTE 1: The above NRM fragment uses `SubNetwork` to hold both NR and LTE external entities and frequencies.

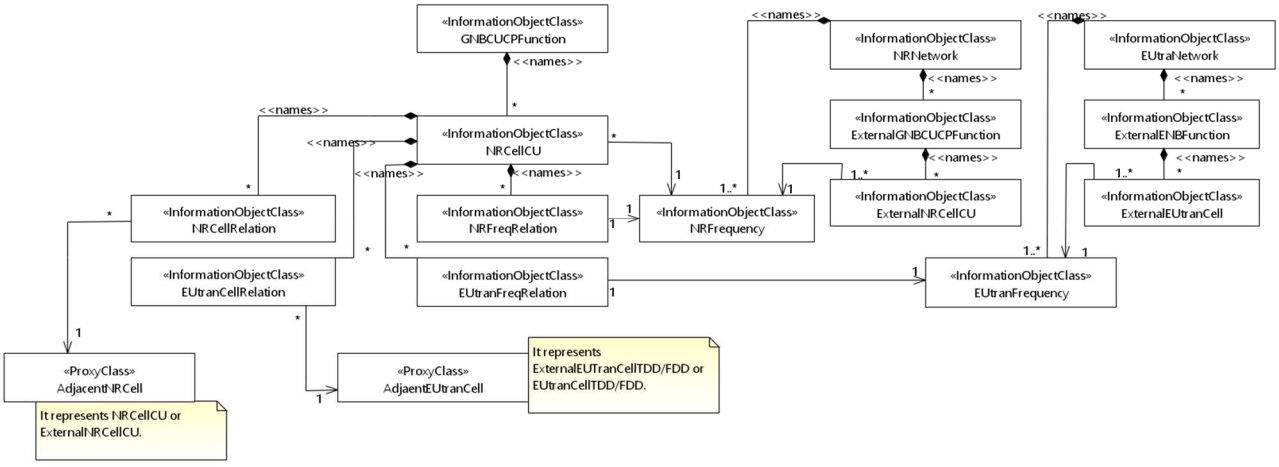


Figure 4.2.1.1-5: Cell Relation view for all deployment scenarios

NOTE 2: The above NRM fragment uses `NRNetwork` to hold NR external entities and frequency and using `EUtraNetwork` to hold LTE external entities and frequency. The `NRNetwork` and `EUtraNetwork` are subclasses of `SubNetwork` (defined in TS 28.622 [30]) with no additional attributes. The reason using `NRNetwork` and `EUtraNetwork` is for a clean separation of NR external entities and frequency and LTE external entities and frequency.

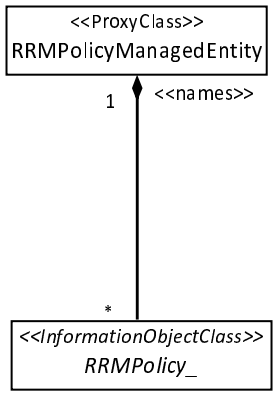


Figure 4.2.1.1-6: NRM fragment for RRM Policies

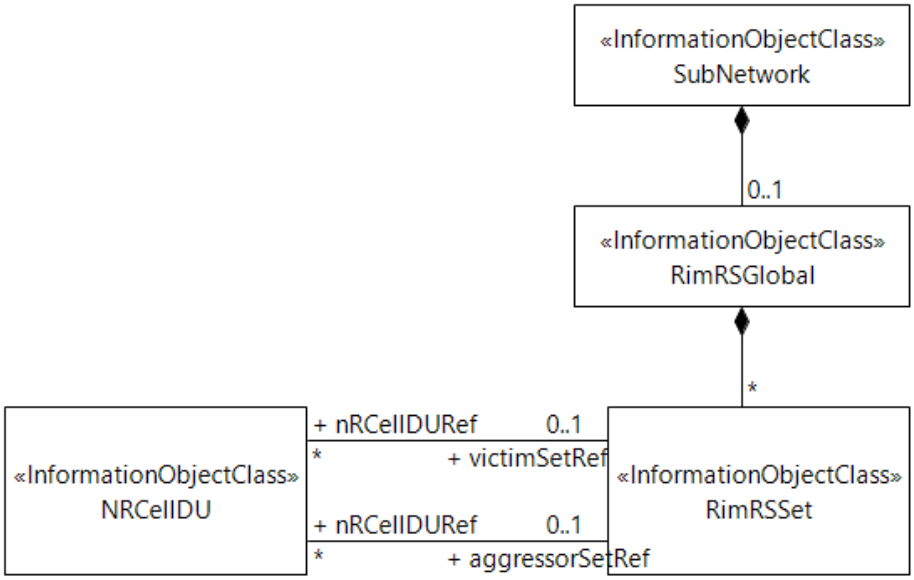


Figure 4.2.1.1-7: NRM fragment to support RIM

The Figure 4.2.1.1-8 shows the NRM fragment for configurable 5QIs in NG-RAN.

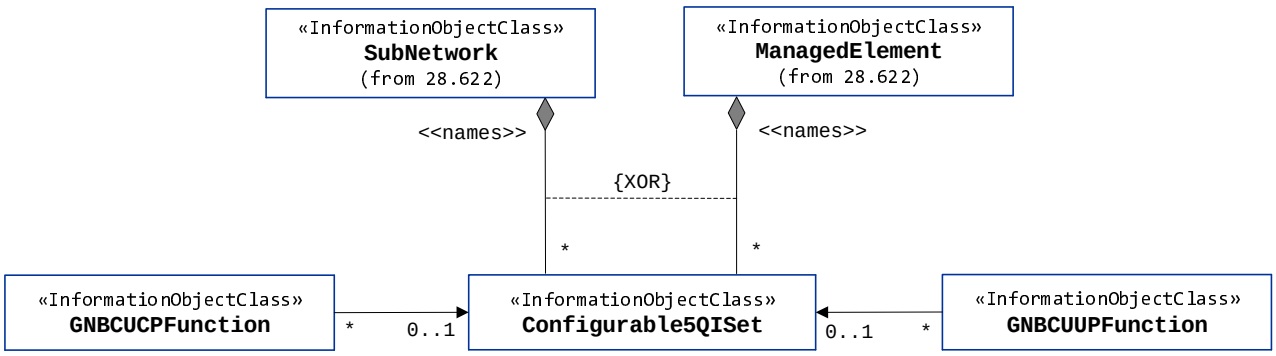


Figure 4.2.1.1-8: NRM fragment for configurable 5QIs in NG-RAN

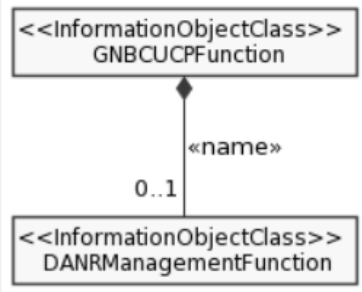


Figure 4.2.1.1-9: NRM fragment for DANR Management

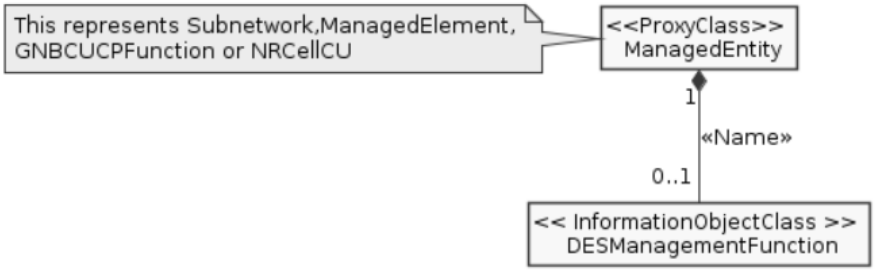


Figure 4.2.1.1-10: NRM fragment for DES Management

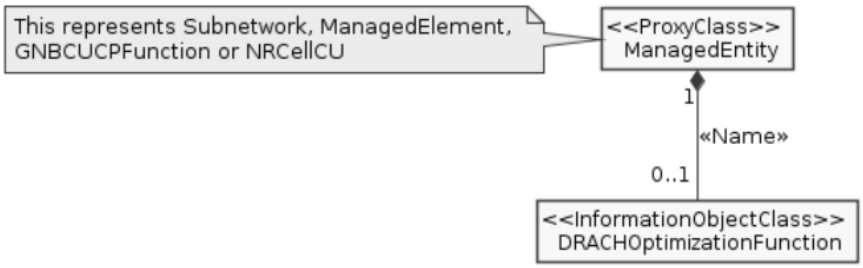


Figure 4.2.1.1-11: NRM fragment for DRACH Management

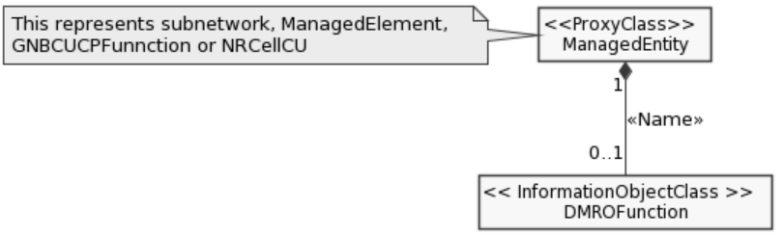


Figure 4.2.1.1-12: NRM fragment for DMRO Management

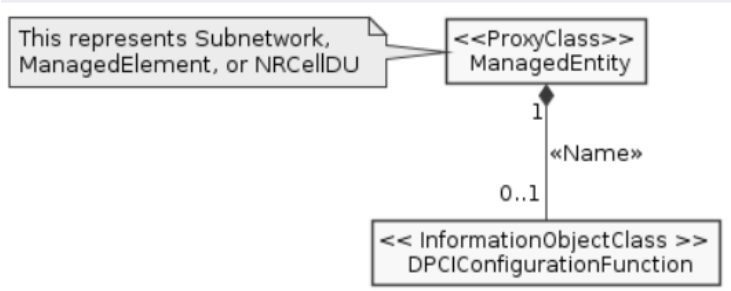


Figure 4.2.1.1-13: NRM fragment for DPCI Management

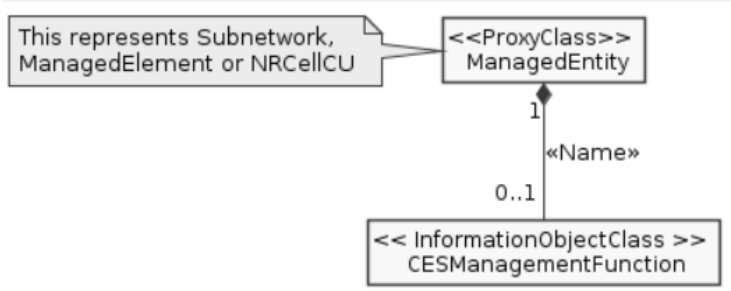


Figure 4.2.1.1-14: NRM fragment for CES Management

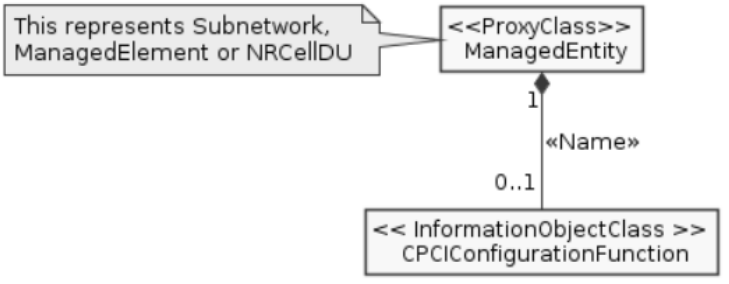
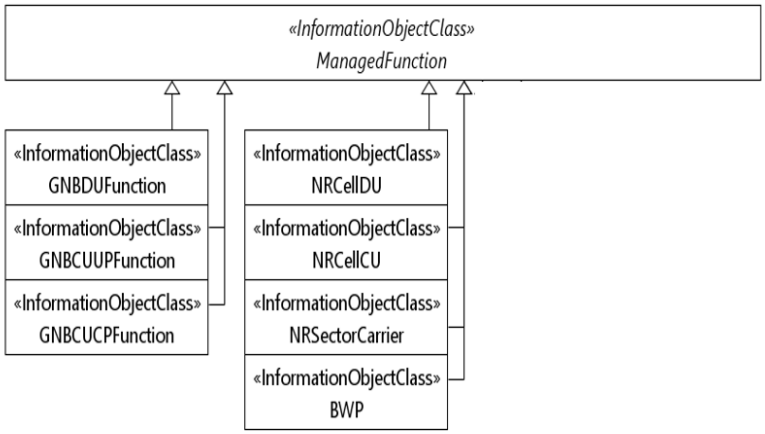


Figure 4.2.1.1-15: NRM fragment for CPCI Management

4.2.1.2 Inheritance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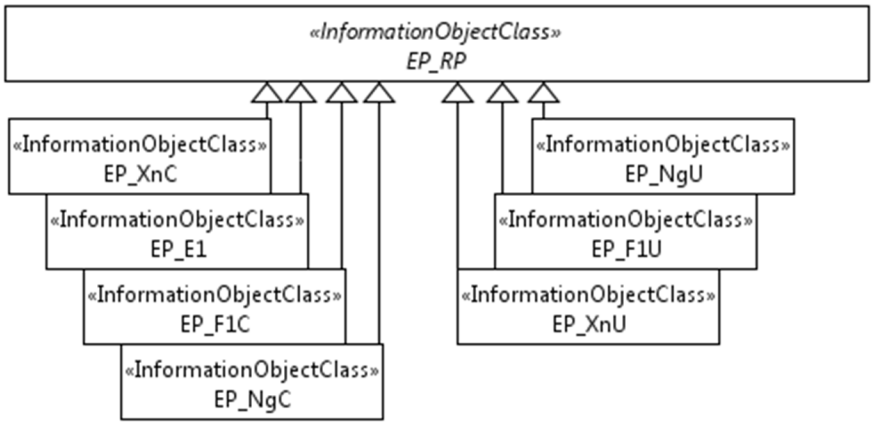
GNBCUUPFunction
«InformationObjectClass»
GNBCUCPFunction
«InformationObjectClass»
NRCellDU
«InformationObjectClass»
NRCellCU
«InformationObjectClass»
NRSectorCarrier
«InformationObjectClass»
BWP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«InformationObjectClass»
EP_XnC
«InformationObjectClass»
EP_E1
«InformationObjectClass»
EP_F1C
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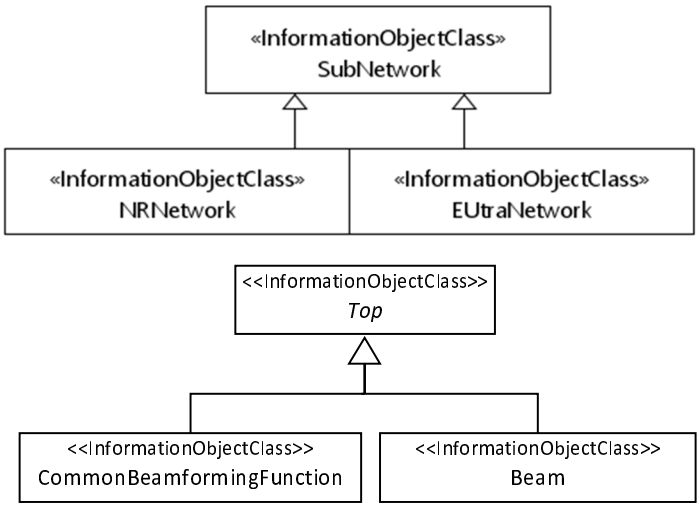
EP_NgC
«InformationObjectClass»
EP_NgU
«InformationObjectClass»
EP_F1U
«InformationObjectClass»
EP_XnU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SubNetwork
«InformationObjectClass»
NRNetwork
«InformationObjectClass»
EUtraNetwork
<<InformationObjectClass>>
Top
<<InformationObjectClass>>
CommonBeamformingFunction
<<InformationObjectClass>>
Beam

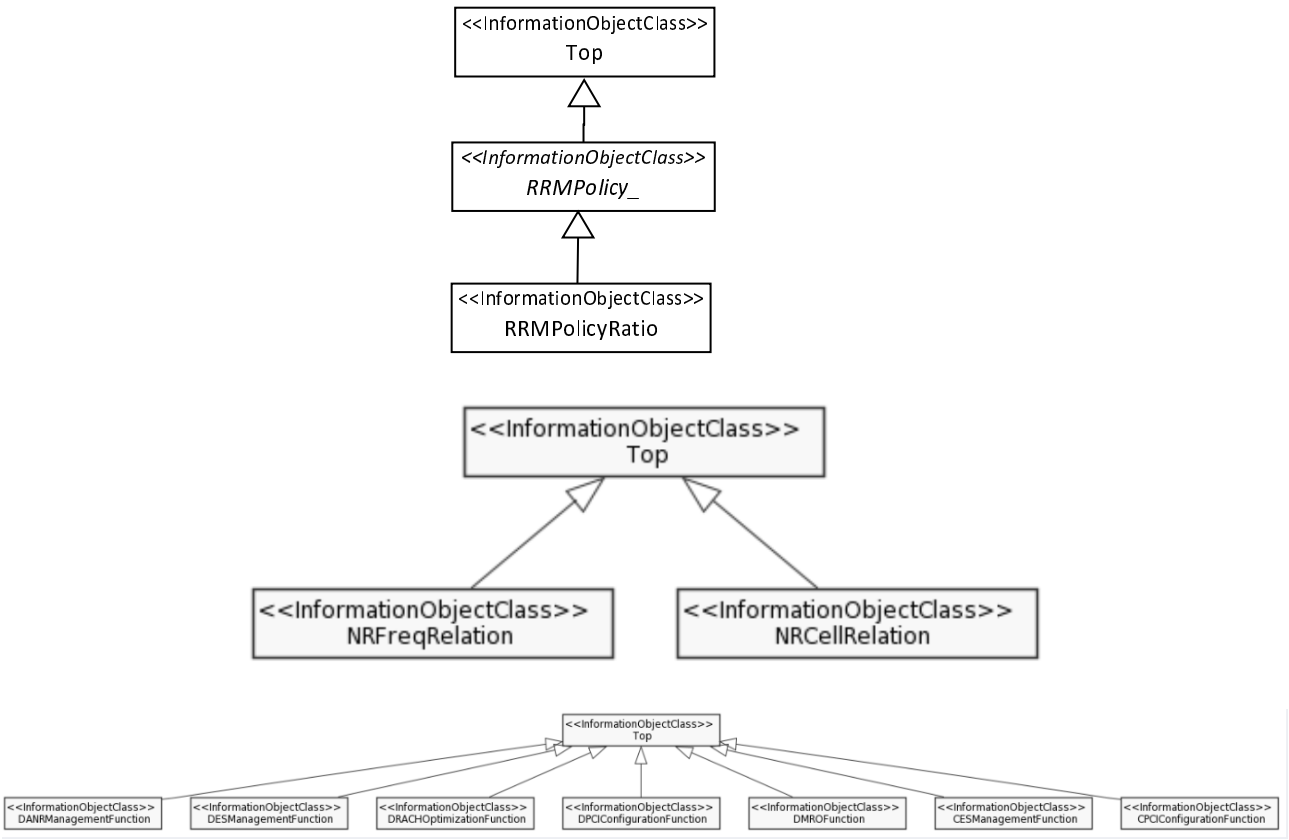

Figure 4.2.1.2-1: Inheritance Hierarchy

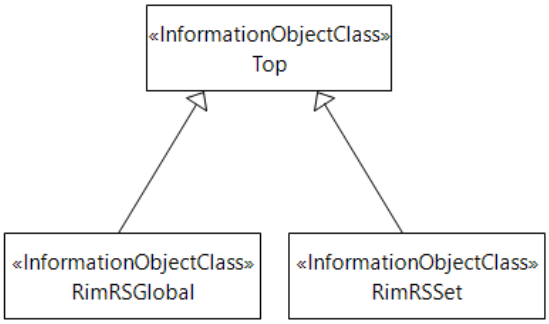

Figure 4.2.1.2-2: Inheritance Hierarchy

4.3 Class definitions

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 tgNB-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	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
gNBDUId	M	T	T	F	T
gNBDUName	O	T	T	F	T
gNBId	M	T	F	F	T
gNBIdLength	M	T	T	F	T
rimRSReportConf	O	T	F	T	T

4.3.1.3 Attribute constraints

None.

4.3.1.4 Notifications

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

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
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	CM	T	T	F	T
mappingSetIDBackhaulAddressList	CM	T	T	F	T
Attribute related to role					
configurable5QISetRef	O	T	T	F	T

4.3.2.3 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.
mappingSetIDBackhaulAddressList	Condition: Remote Interference Management function is supported.

4.3.2.4 Notifications

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

4.3.3 GNBCUUPFunction

4.3.3.1 Definition

For non-split NG-RAN deployment scenario, this IOC together with GNBCUCPFunction 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 GNBCUCPFunction IOC provide management representation of 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-UP 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_XnU, <<IOC>>EP_NgU, <<IOC>>EP_F1U, <<IOC>>EP_E1.	<<IOC>>EP_XnU, <<IOC>>EP_NgU, <<IOC>>EP_F1U.	<<IOC>>EP_XnU, <<IOC>>EP_NgU.
en-gNB	<<IOC>>EP_X2U, <<IOC>>EP_S1U, <<IOC>>EP_F1U, <<IOC>>EP_E1.	<<IOC>>EP_X2U, <<IOC>>EP_S1U, <<IOC>>EP_F1U.	<<IOC>>EP_X2U, <<IOC>>EP_S1U.

4.3.3.2 Attributes

The GNBCUUPFunction 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
gNBCUUPId	M	T	F	T	T
pLMNInfoList	M	T	T	F	T
gNBId	M	T	T	F	T
gNBIdLength	M	T	T	F	T
Attribute related to role					
configurable5QISetRef	O	T	T	F	T

4.3.3.3 Attribute constraints

None.

4.3.3.4 Notifications

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

4.3.4 NRCellCU

4.3.4.1 Definition

This IOC represents the part of NR cell information that is responsible for the management of inter-cell mobility and neighbour relations via ANR.

4.3.4.2 Attributes

The NRCellCU 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
cellLocalId	M	T	T	F	T
pLMNInfoList	M	T	T (Note)	F	T
Attribute related to role					
nRFrequencyRef	M	T	F	F	T
Note: Whether the attribute "pLMNId" in the PLMNInfo can be writable depends on the implementation.					

NOTE 1: Void.

NOTE 2: Void.

4.3.4.3 Void

4.3.4.4 Notifications

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

4.3.5 NRCellDU

4.3.5.1 Definition

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 [32]. 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.

NOTE: Void

4.3.5.2 Attributes

The NRCellDU 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
cellLocalId	M	T	T	F	T
operationalState	M	T	F	F	T
administrativeState	M	T	T	F	T
cellState	M	T	F	F	T
pLMNInfoList	M	T	T	F	T
nRPCI	M	T	T	F	T
nRTAC	CM	T	T	F	T
arfcnDL	M	T	T	F	T
arfcnUL	CM	T	T	F	T
arfcnSUL	CM	T	T	F	T
bSChannelBwDL	M	T	T	F	T
ssbFrequency	CM	T	T	F	T
ssbPeriodicity	M	T	T	F	T
ssbSubCarrierSpacing	CM	T	T	F	T
ssbOffset	M	T	T	F	T
ssbDuration	M	T	T	F	T
bSChannelBwUL	CM	T	T	F	T
bSChannelBwSUL	CM	T	T	F	T
Attribute related to role					
nRSectorCarrierRef	M	T	T	F	T
bWPRef	M	T	T	F	T
nRFrequencyRef	CO	T	T	F	T
victimSetRef	CM	T	T	F	T
aggressorSetRef	O	T	T	F	T

NOTE 1: No state propagation is implied.

NOTE 2: Void

4.3.5.3 Attribute constraints

Name	Definition
arfcnUL Support Qualifier	Condition: The cell has an uplink (FDD or TDD)
arfcnSUL Support Qualifier	Condition: The cell has a supplementary uplink
bSChannelBwUL Support Qualifier	Condition: The cell has an uplink (FDD or TDD)
bSChannelBwSUL Support Qualifier	Condition: The cell has a supplementary uplink
nRFrequencyRef Support Qualifier	Condition: Non-split deployment scenario is supported
ssbFrequency Support Qualifier	Condition: nRFrequencyRef is not used.
ssbSubCarrierSpacing Support Qualifier	Condition: nRFrequencyRef is not used.
victimSetRef Support Qualifier	Condition: RIM feature is supported

4.3.5.4 Notifications

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

4.3.6 NRSectorCarrier

4.3.6.1 Definition

This <<IOC>>NRSectorCarrier represents the resources of each transmission point included in the cell. These in general have different physical locations (of the antennae), and possibly different frequencies or bandwidths. The UE is not directly aware of which NRSectorCarrier resources the network uses for its connection.

An NR sector-carrier can have downlink, uplink or both as specified by txDirection. Attributes related to unavailable direction (DL or UL) shall not be set.

Additional NRSectorCarriers not directly associated to one cell only can also be configured.

If a value of arfcnDL, arfcnUL, bSChannelBwDL or bSChannelBwUL can be derived unambiguously from the referring cell, then that attribute needs not be present. That will not be possible if the NRSectorCarrier is used for supplementary uplink, if it is not directly associated to a cell, or if the sector-carrier uses only a part of the cell's channel bandwidth. Thus, at least in those cases the applicable attributes have to be present and their values need to be set.

4.3.6.2 Attributes

The NRSectorCarrier 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
txDirection	M	T	T	F	T
configuredMaxTxPower	CM	T	T	F	T
configuredMaxTxEIRP	CM	T	T	F	T
arfcnDL	CM	T	T	F	T
arfcnUL	CM	T	T	F	T
bSChannelBwDL	CM	T	T	F	T
bSChannelBwUL	CM	T	T	F	T
attribute related to role					
sectorEquipmentFunctionRef	M	T	T	F	T

4.3.6.3 Attribute constraints

Name	Definition
configuredMaxTxPower	Condition: The sector-carrier has a downlink. Configuration of Tx power at antenna port reference point is supported.
configuredMaxTxEIRP	Condition: The sector-carrier has a downlink. Configuration of emitted isotropic radiated power is supported.
arfcnDL	Condition: The sector-carrier has a downlink AND the value differs from the referring cell's value of arfcnDL.
arfcnUL	Condition: The sector-carrier has an uplink AND the value differs from the referring cell's value of arfcnUL.
bSChannelBwDL	Condition: The sector-carrier has a downlink AND the value differs from the referring cell's value of bSChannelBwDL.
bSChannelBwUL	Condition: The sector-carrier has an uplink AND the value differs from the referring cell's value of bSChannelBwUL.

4.3.6.4 Notifications

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

4.3.7 BWP

4.3.7.1 Definition

This IOC represents a bandwidth part (BWP) defined in 3GPP TS 38.211 [32], subclause 4.4.5. A bandwidth part is related to downlink, uplink or supplementary uplink resource grids, and is defined by its subcarrier spacing (SCS), cyclic prefix and location and size related to the common resource grid for the applicable SCS.

A BWP can be either an initial BWP used for initial access, or other ("regular") BWP configured for relevant UEs that support the BWP's characteristics.

4.3.7.2 Attributes

The BWP 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
bwpContext	M	T	T	F	T
isInitialBwp	M	T	T	F	T
subCarrierSpacing	M	T	T	F	T
cyclicPrefix	M	T	T	F	T
startRB	M	T	T	F	T
numberOfRBs	M	T	T	F	T

4.3.7.3 Attribute constraints

None.

4.3.7.4 Notifications

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

4.3.8 EP_E1

4.3.8.1 Definition

This IOC represents the local end point of the logical link, supporting E1 interface between gNB-CU-CP and gNB-CU-UP. The E1 interface is defined in 3GPP TS 38.401 [4].

4.3.8.2 Attributes

The EP_E1 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

4.3.8.3 Attribute constraints

None.

4.3.8.4 Notifications

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

4.3.9 EP_XnU

4.3.9.1 Definition

This IOC 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. The user plane PDUs are carried on GTP-U/UDP/IP/Data link layer/Physical layer stack. See subclause 7.2 of 3GPP TS 38.420 [6].

4.3.9.2 Attributes

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

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

4.3.9.3 Attribute constraints

None.

4.3.9.4 Notifications

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

4.3.10 EP_NgC

4.3.10.1 Definition

This IOC represents the local end point of the control plane interface (NG-C) between the gNB and NG-Core entity. The transport network layer is built on IP transport. For the reliable transport of signalling messages, SCTP is added on top of IP. The application layer signalling protocol is referred to as NG-AP (NG Application Protocol).

3GPP TS 38.470 [7] noted that "one gNB-CU and a set of gNB-DUs are visible to other logical nodes as a gNB or an en-gNB where the gNB terminates the Xn and the NG interfaces, and the en-gNB terminates the X2 and the S1-U interfaces".

4.3.10.2 Attributes

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

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

4.3.10.3 Attribute constraints

None.

4.3.10.4 Notifications

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

4.3.11 EP_NgU

4.3.11.1 Definition

This IOC represents the local end point of the NG user plane (NG-U) interface between the gNB and the UPGW. The interface provides non-guaranteed delivery of user plane PDUs between the gNB and the UPGW. GTP-U is baseline for this interface.

3GPP TS 38.470 [7] noted that "one gNB-CU and a set of gNB-DUs are visible to other logical nodes as a gNB or an en-gNB where the gNB terminates the Xn and the NG interfaces, and the en-gNB terminates the X2 and the S1-U interfaces".

4.3.11.2 Attributes

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

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

4.3.11.3 Attribute constraints

None.

4.3.11.4 Notifications

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

4.3.12 EP_F1C

4.3.12.1 Definition

This IOC represents the local end point of the control plane interface (F1-C) between the DU and CU or CU-CP. The transport network layer is based on IP transport with the SCTP on top of IP. The application layer signalling protocol is referred to as NG-AP (NG Application Protocol). See subclause 7.1 of 3GPP TS 38.470 [7].

3GPP TS 38.470 [7] noted that "one gNB-CU and a set of gNB-DUs are visible to other logical nodes as a gNB or an en-gNB where the gNB terminates the Xn and the NG interfaces, and the en-gNB terminates the X2 and the S1-U interfaces".

4.3.12.2 Attributes

The EP_F1C IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

4.3.12.3 Attribute constraints

None.

4.3.12.4 Notifications

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

4.3.13 EP_F1U

4.3.13.1 Definition

This IOC represents the local end point of the user plane interface (F1-U) between the DU and CU or CU-UP. The transport network layer is based on IP transport, with the UDP and GTP-U on top of IP.

3GPP TS 38.470 [7] noted that "one gNB-CU and a set of gNB-DUs are visible to other logical nodes as a gNB or an en-gNB where the gNB terminates the Xn and the NG interfaces, and the en-gNB terminates the X2 and the S1-U interfaces".

4.3.13.2 Attributes

The EP_F1U IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

4.3.13.3 Attribute constraints

None.

4.3.13.4 Notifications

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

4.3.14 EP_S1U

4.3.14.1 Definition

This IOC represents the local end point of the logical link, supporting S1-U interface towards a S-GW node. The S1-U interface is defined in 3GPP TS 36.410 [14].

4.3.14.2 Attributes

The EP_S1U IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

4.3.14.3 Attribute constraints

None.

4.3.14.4 Notifications

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

4.3.15 EP_X2C

4.3.15.1 Definition

This IOC 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, which is defined in 3GPP TS 36.423 [15]. EN-DC is defined in 3GPP TS 37.340 [9].

4.3.15.2 Attributes

The EP_X2C IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

4.3.15.3 Attribute constraints

None.

4.3.15.4 Notifications

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

4.3.16 EP_X2U

4.3.16.1 Definition

This IOC represents the local end-point of a logical link supporting the X2 user plane (X2-U) interface used in EN-DC, which is defined in 3GPP TS 36.425 [16].

4.3.16.2 Attributes

The EP_X2U IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

4.3.16.3 Attribute constraints

None.

4.3.16.4 Notifications

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

4.3.17 EP_XnC

4.3.17.1 Definition

This IOC 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. See subclause 7 of 3GPP TS 38.420 [6].

4.3.17.2 Attributes

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

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

4.3.17.3 Attribute constraints

None

4.3.17.4 Notifications

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

4.3.18 ExternalGNBCUCPFunction

4.3.18.1 Definition

This IOC represents the properties, known by the management function, of a GNBCUCPFunction managed by another management function. For more information about GNBCUCPFunction, see subclause 4.3.2.

4.3.18.2 Attributes

The ExternalGNBCUCPFunction 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
pLMNId	M	T	T	F	T

4.3.18.3 Attribute constraints

None.

4.3.18.4 Notifications

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

4.3.19 ExternalGNBCUUPFunction

4.3.19.1 Definition

This IOC represents the properties, known by the management function, of a GNBCUUPFunction managed by another management function. For more information about GNBCUUPFunction, see subclause 4.3.3.

4.3.19.2 Attributes

The ExternalGNBCUUPFunction 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

4.3.19.3 Attribute constraints

None.

4.3.19.4 Notifications

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

4.3.20 ExternalGNBDUFunction

4.3.20.1 Definition

This IOC represents the properties, known by the management function, of a GNBDUFunction managed by another management function. For more information about GNBDUFunction, see subclause 4.3.1.

4.3.20.2 Attributes

The ExternalGNBDUFunction 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	T	T
gNBIdLength	M	T	T	F	T

4.3.20.3 Attribute constraints

None.

4.3.20.4 Notifications

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

4.3.21 ExternalUPFFunction

4.3.21.1 Definition

This IOC represents the properties, known by the management function, of a UPFFunction managed by another management function. For more information about UPFFunction, see subclause 5.3.3.

4.3.21.2 Attributes

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

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable

4.3.21.3 Attribute constraints

None.

4.3.21.4 Notifications

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

4.3.22 ExternalAMFFunction

4.3.22.1 Definition

This IOC represents the properties, known by the management function, of an AMFFunction managed by another management function. For more information about AMFFunction, see subclause 5.3.

4.3.22.2 Attributes

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

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable

4.3.22.3 Attribute constraints

None

4.3.22.4 Notifications

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

4.3.23 Void

4.3.24 ENBFunction <<ProxyClass>>

4.3.24.1 Definition

This IOC represents an <<IOC>>ENBFunction and <<IOC>>ExternalENBFunction.

4.3.24.2 Attributes

See that defined in <<IOC>>ENBFunction and <<IOC>>ExternalENBFunction.

4.3.24.3 Attribute constraints

See that defined in <<IOC>>ENBFunction and <<IOC>>ExternalENBFunction.

4.3.24.4 Notifications

See respective IOCs.

4.3.25 GNBCUCPFunction <<ProxyClass>>

4.3.25.1 Definition

This IOC represents an <<IOC>>GNBCUCPFunction and <<IOC>>ExternalGNBCUCPFunction.

4.3.25.2 Attributes

See that defined in <<IOC>>GNBCUCPFunction and <<IOC>>ExternalGNBCUCPFunction.

4.3.25.3 Attribute constraints

See respective IOCs.

4.3.25.4 Notifications

See respective IOCs.

4.3.26 GNBCUUPFunction <<ProxyClass>>

4.3.26.1 Definition

This IOC represents an <<IOC>>GNBCUUPFunction and <<IOC>>ExternalGNBCUUPFunction.

4.3.26.2 Attributes

See that defined in <<IOC>>GNBCUUPFunction and <<IOC>>ExternalGNBCUUPFunction.

4.3.26.3 Attribute constraints

See that defined in <<IOC>>GNBCUUPFunction and <<IOC>>ExternalGNBCUUPFunction.

4.3.26.4 Notifications

See respective IOCs.

4.3.27 GNBDUFunction <<ProxyClass>>

4.3.27.1 Definition

This IOC represents an <<IOC>>GNBDUFunction and <<IOC>>ExternalGNBDUFunction.

4.3.27.2 Attributes

See that defined in <<IOC>>GNBDUFunction and <<IOC>>ExternalGNBDUFunction.

4.3.27.3 Attribute constraints

See that defined in <<IOC>>GNBDUFunction and <<IOC>>ExternalGNBDUFunction.

4.3.27.4 Notifications

See respective IOCs.

4.3.28 ServingGWFFunction <<ProxyClass>>

4.3.28.1 Definition

This IOC represents an <<IOC>>ServingGWFFunction and <<IOC>>ExternalServingGWFunction.

4.3.28.2 Attributes

See that defined in <<IOC>>ServingGWFunction and <<IOC>>ExternalServingGWFunction.

4.3.28.3 Attribute constraints

See that defined in <<IOC>>ServingGWFunction and <<IOC>>ExternalServingGWFunction.

4.3.28.4 Notifications

See respective IOCs.

4.3.29 UPFFunction <<ProxyClass>>

4.3.29.1 Definition

This IOC represents an <<IOC>>UPFFunction and <<IOC>>ExternalUPFFunction.

4.3.29.2 Attributes

See that defined in <<IOC>>UPFFunction and <<IOC>>ExternalUPFFunction.

4.3.29.3 Attribute constraints

See that defined in <<IOC>>UPFFunction and <<IOC>>ExternalUPFFunction.

4.3.29.4 Notifications

See respective IOCs.

4.3.30 AMFFunction <<ProxyClass>>

4.3.30.1 Definition

This IOC represents an <<IOC>>AMFFunction and <<IOC>>ExternalAMFFunction.

4.3.30.2 Attributes

See that defined in <<IOC>>AMFFunction and <<IOC>>ExternalAMFFunction.

4.3.30.3 Attribute constraints

See that defined in <<IOC>>AMFFunction and <<IOC>>ExternalAMFFunction.

4.3.30.4 Notifications

See respective IOCs.

4.3.31 Void

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
isRemoveAllowed	CM	T	T	F	T
isHOAllowed	CM	T	T	F	T
isESCoveredBy	CM	T	T	F	T
isENDCAllowed	CM	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

Name	Definition
isRemoveAllowed	Condition: ANR function is supported in the source cell.
isHOAllowed	Condition: ANR function is supported in the source cell.
isESCoveredBy	Condition: Energy Saving function is supported.
isENDCAllowed	Condition: Multi-Radio Dual Connectivity with the EPC (see TS 37.340 [9] clause 4.1.2) is supported.

4.3.32.4 Notifications

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

4.3.33 NRFreqRelation

4.3.33.1 Definition

This IOC, together with the target NRFrequency, represents the frequency properties applicable to the referencing NRCellRelation.

4.3.33.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
offsetMO	O	T	T	F	F
blackListEntry	O	T	T	F	F
blackListEntryIdleMode	O	T	T	F	F
cellReselectionPriority	O	T	T	F	F
cellReselectionSubPriority	O	T	T	F	F
pMax	O	T	T	F	F
qOffsetFreq	O	T	T	F	F
qQualMin	O	T	T	F	F
qRxLevMin	M	T	T	F	F
threshXHighP	M	T	T	F	F
threshXHighQ	CM	T	T	F	F
threshXLowP	M	T	T	F	F
threshXLowQ	CM	T	T	F	F
tReselectionNr	M	T	T	F	F
tReselectionNRSfHigh	O	T	T	F	F
tReselectionNRSfMedium	O	T	T	F	F
attribute related to role					
nRFrequencyRef	M	T	T	F	F

4.3.33.3 Attribute constraints

Name	Definition
threshXHighQ	Condition: RSRQ used in SIB4.
threshXLowQ	Condition: RSRQ used in SIB4.

4.3.33.4 Notifications

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

4.3.34 Void

4.3.35 ExternalNRCellCU

4.3.35.1 Definition

This abstract IOC represents the properties of an NRCellCU controlled by another Management Service Provider. This IOC contains necessary attributes for inter-system and intra-system handover. It also contains a subset of the attributes of related IOCs controlled by Management Service Provider. The way to maintain consistency between the attribute values of these IOCs is outside the scope of the present document.

4.3.35.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
cellLocalId	M	T	T	F	T
nRPCI	M	T	T	F	T
plmnIdList	M	T	T	F	T
attribute related to role					
nRFrequencyRef	M	T	T	F	T

4.3.35.3 Attribute constraints

None.

4.3.35.4 Notifications

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

4.3.36 RRMPolicyRatio

4.3.36.1 Definition

This IOC represents the properties of RRMPolicyRatio. RRMPolicyRatio is one realization of abstract *RRMPolicy_ IOC.* RRMPolicyRatio has three attributes, apart from those inherited (DN, resourceType, rRMPolicyMemberList).

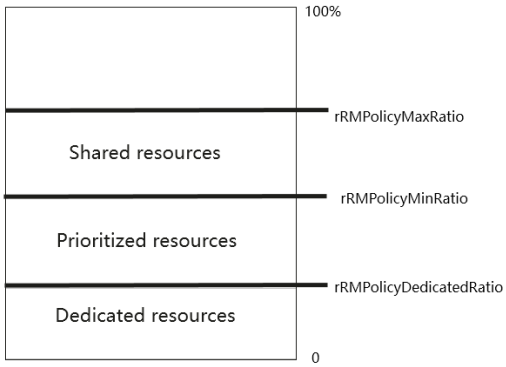

Figure 4.3.36-1 Structure of RRMPolicyRatio

- The attribute `rRMPolicyMaxRatio` defines the maximum resource usage quota for the associated `rRMPolicyMemberList`, including at least one of shared resources, prioritized resources and dedicated resources. The sum of the 'rRMPolicyMaxRatio' values assigned to all RRMPolicyRatio(s) name-contained by same MangedEntity can be greater than 100.

- The attribute `rRMPolicyMinRatio` defines the minimum resource usage quota for the associated RRMPolicyMemberList, including at least one of prioritized resources and dedicated resources, which means the resources quota that need to be guaranteed for use by the associated rRMPolicyMemberList. The sum of the 'rRMPolicyMinRatio' values assigned to all RRMPolicyRatio(s) name-contained by same MangedEntity shall be less or equal 100.

- The attribute `rRMPolicyDedicatedRatio` defines the dedicated resource usage quota for the RRMPolicyMemberList, including dedicated resources. The sum of the 'rRMPolicyDedicatedRatio' values assigned to all RRMPolicyRatio(s) name-contained by same MangedEntity shall be less or equal 100.

The following are the definition for above mentioned three resource categories:

- **Shared resources**: means the resources that are shared with other rRMPolicyMemberList(s) (i.e. the rRMPolicyMemberList(s) defined in RRMPolicyRatio(s) name-contained by the same ManagedEntity). The shared resources are not guaranteed for use by the associated rRMPolicyMemberList. The shared resources quota is represented by [rRMPolicyMaxRatio-rRMPolicyMinRatio].

- **Priortized resources:** means the resources are preferentially used by the associated RRMPolicyMemberList. These resources are guaranteed for use by the associated RRMPolicyMemberList when it needs to use them. When not used, these resources may be used by other rRMPolicyMemberList(s) (i.e. the rRMPolicyMemberList(s) defined in RRMPolicyRatio(s) name-contained by the same ManagedEntity). The prioritized resources quota is represented by [rRMPolicyMinRatio-rRMPolicyDedicatedRatio]

- **Dedicated resources:** means the resources are dedicated for use by the associated RRMPolicyMemberList. These resources can not be shared even if the associated RRMPolicyMember does not use them. The Dedicated resources quota is represented by [rRMPolicyDedicatedRatio].

4.3.36.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
rRMPolicyMaxRatio	M	T	T	F	T
rRMPolicyMinRatio	M	T	T	F	T
rRMPolicyDedicatedRatio	O	T	T	F	T

4.3.36.3 Attribute constraints

None

4.3.36.4 Notifications

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

4.3.37 S-NSSAI <<dataType>>

4.3.37.1 Definition

This data type represents an S-NSSAI. An NSSAI is a set of supported S-NSSAI(s), an S-NSSAI is comprised of an SST (Slice/Service type) and an optional SD (Slice Differentiator) field, (See TS 23.003 [13]).

4.3.37.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
sST	M	T	T	F	T
sD	O	T	T	F	T

4.3.37.3 Attribute constraints

None

4.3.37.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

4.3.38 NRFrequency

4.3.38.1 Definition

This IOC represents certain NR frequency properties.

4.3.38.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
absoluteFrequencySSB	M	T	T	F	T
sSBSubCarrierSpacing	M	T	T	F	T
multiFrequencyBandListNR	O	T	F	F	T

4.3.38.3 Attribute constraints

None.

4.3.38.4 Notifications

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

4.3.39 CommonBeamformingFunction

4.3.39.1 Definition

This <<IOC>>CommonBeamformingFunction represents common beamforming functionality (eg: SSB beams) for the NRSectorCarrier.

The CommonBeamformingFunction provides capability to configure the advanced antenna for a sector carrier. The configuration capability is provided by selection of coverageShape, digitalTilt and digitalAzimuth. These attributes represent the wanted coverage area and radiation pattern on a sector carrier related to an antenna transmission point.

This configuration capability assumes the system shall handle configuration of SSB beams within the sector carrier. Individual SSB beams within a sector carrier cannot be independently configured as this depends on many conditions and constraints, for instance TDD patterns, allocations of PRACH occasions, SIB1 and mobility considerations.

The associated <<IOC>> Beam provides information beam direction and beam width for the associated SSB beams as a result of the configuration. The beams addressed in this definition are the common beams. There may be more than one beam per CommonBeamformingFunction for the NRSectorCarrier.

4.3.39.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
coverageShape	M	T	T	F	T
digitalTilt	M	T	T	F	T
digitalAzimuth	M	T	T	F	T

4.3.39.3 Attribute constraints

None.

4.3.39.4 Notifications

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

4.3.40 Beam

4.3.40.1 Definition

This <<IOC>>Beam represents the per-Beam information required for, e.g. beam performance management utilizing measurements generated in the RAN. TS 38.104 [12] relates to beam transmission, TS 38.215 [55] to beam measurements, and TS 38.331 [54] to reporting of those measurements and associated beam failure Information Elements, clauses 5.5.3, 5.5.5.2, 6.3.2. 6.2.2.

Measurements on common beams may be correlated with associated spatial beam information to assist use cases like troubleshooting performance problems, or SON functions like Coverage & Capacity Optimization.

<<IOC>>Beam 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. There may be more than one beam per CommonBeamformingFunction for an NRSectorCarrier. Informational note, beam direction and width are characteristics—a representation—of directional energy vectors.

4.3.40.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
beamIndex	M	T	F	F	T
beamType	O	T	F	F	T
beamAzimuth	CM	T	F	F	T
beamTilt	CM	T	F	F	T
beamHorizWidth	CM	T	F	F	T
beamVertWidth	CM	T	F	F	T

4.3.40.3 Attribute constraints

Name	Definition
beamAzimuth Support Qualifier	Condition: The beamType is "SSB-BEAM" and Supported by Equipment
beamTilt Support Qualifier	Condition: The beamType is "SSB-BEAM" and Supported by Equipment
beamHorizWidth Support Qualifier	Condition: The beamType is "SSB-BEAM" and Supported by Equipment
beamVertWidth Support Qualifier	Condition: The beamType is "SSB-BEAM" and Supported by Equipment

4.3.41 PLMNInfo <<dataType>>

4.3.41.1 Definition

This <<dataType>> represents the PLMN supported by the <<IOC>> using this <<dataType>> as one of its attributes. In case of network slicing feature is supported, this <<dateType>> also represents the S-NSSAI in the PLMN supported by the <<IOC>> using this <<dataType>> as one of its attributes.

4.3.41.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
pLMNId	M	T	T	F	T
sNSSAI	CM	T	T	F	T

4.3.41.3 Attribute constraints

Name	Definition
sNSSAI Support Qualifier	Condition: Network slicing feature is supported.

4.3.41.4 Notifications

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

4.3.42 RRMPolicyMember <<dataType>>

4.3.42.1 Definition

This <<dataType>> 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 is assigned a specific amount of RRM resources based on settings in *RRMPolicy_.*

4.3.42.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
pLMNId	M	T	T	F	T
sNSSAI	CM	T	T	F	T

4.3.42.3 Attribute constraints

Name	Definition
sNSSAI Support Qualifier	Condition: Network slicing is supported

4.3.42.4 Notifications

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

4.3.43 *RRMPolicy_*

4.3.43.1 Definition

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 is 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, see the inheritance in Figure 4.2.1.2-1. This RRM framework allows adding new policies, both standardized or as vendor specific, by inheriting from the abstract *RRMPolicy_ IOC*.

4.3.43.2 Attributes

The *RRMPolicy_* IOC have the following attributes, apart from those inherited from TOP IOC (defined in TS 28.622 [30]):

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
resourceType	M	T	T	F	T
rRMPolicyMemberList	M	T	T	F	T

4.3.43.3 Attribute constraints

None.

4.3.43.4 Notifications

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

4.3.44 RRMPolicyManagedEntity <<ProxyClass>>

4.3.44.1 Definition

This represents an <<IOC>>NRCellCU, or an <<IOC>>NRCellDU or an <<IOC>>GNBCUUPFunction, or an <<IOC>>GNBCUCPFunction, or an <<IOC>>GNBDUFunction.

If <<IOC>>NRCellCU is used, which means that a RRMPolicy shall be applied to an RRM resource in the NRCellCU. The possible RRM resource(s) owned by NRCellCU is defined in the resourceType attribute.

If <<IOC>>NRCellDU is used, which means that a RRMPolicy shall be applied to an RRM resource in the NRCellDU. The possible RRM resource(s) owned by NRCellDU is defined in the resourceType attribute.

If <<IOC>>GNBCUUPFunction is used, which means that a RRMPolicy shall be applied to an RRM resource in the GNBCUUPFunction. The possible RRM resource(s) owned by GNBCUUPFunction is defined in the resourceType attribute.

If <<IOC>>GNBCUCPFunction is used, which means that a RRMPolicy shall be applied to an RRM resource in the GNBCUCPFunction. The possible RRM resource(s) owned by GNBCUCPFunction is defined in the resourceType attribute.

If <<IOC>>GNBDUFunction is used, which means that a RRMPolicy shall be applied to an RRM resource in the GNBDUFunction. The possible RRM resource(s) owned by GNBDUFunction is defined in the resourceType attribute.

4.3.44.2 Attributes

See that defined in <<IOC>>NRCellCU, <<IOC>>NRCellDU, <<IOC>>GNBCUUPFunction, <<IOC>>GNBCUCPFunction or <<IOC>>GNBDUFunction.

4.3.44.3 Attribute constraints

See that defined in <<IOC>>NRCellCU, <<IOC>>NRCellDU, <<IOC>>GNBCUUPFunction, <<IOC>>GNBCUCPFunction, or <<IOC>>GNBDUFunction.

4.3.44.4 Notifications

See respective IOCs.

4.3.45 GNBCUCPNeighbour <<ProxyClass>>

4.3.45.1 Definition

This IOC represents an <<IOC>>GNBCUCPFunction, <<IOC>>ExternalGNBCUCPFunction, <<IOC>>ENBFunction and <<IOC>>ExternalENBFunction.

4.3.45.2 Attributes

See that defined in <<IOC>>GNBCUCPFunction, <<IOC>>ExternalGNBCUCPFunction, <<IOC>>ENBFunction and <<IOC>>ExternalENBFunction.

4.3.45.3 Attribute constraints

See that defined in <<IOC>>GNBCUCPFunction, <<IOC>>ExternalGNBCUCPFunction, <<IOC>>ENBFunction and <<IOC>>ExternalENBFunction.

4.3.45.4 Notifications

See respective IOCs.

4.3.46 GNBCUUPNeighbour <<ProxyClass>>

4.3.46.1 Definition

This IOC represents an <<IOC>>GNBCUUPFunction, <<IOC>>ExternalGNBCUUPFunction, <<IOC>>ENBFunction and <<IOC>>ExternalENBFunction.

4.3.46.2 Attributes

See that defined in <<IOC>>GNBCUUPFunction, <<IOC>>ExternalGNBCUUPFunction, <<IOC>>ENBFunction and <<IOC>>ExternalENBFunction.

4.3.46.3 Attribute constraints

See that defined in <<IOC>>GNBCUUPFunction, <<IOC>>ExternalGNBCUUPFunction, <<IOC>>ENBFunction and <<IOC>>ExternalENBFunction.

4.3.46.4 Notifications

See respective IOCs.

4.3.47 MappingSetIDBackhaulAddress <<dataType>>

4.3.47.1 Definition

This data type represents the properties describing the mapping relationship between set ID and backhaul address of gNB.

4.3.47.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
setID	M	T	T	F	T
backhaulAddress	M	T	T	F	T

4.3.47.3 Attribute constraints

None.

4.3.47.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

4.3.48 BackhaulAddress <<dataType>>

4.3.48.1 Definition

This data type represents the properties describing the backhaul address of gNB.

4.3.48.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
gNBId	M	T	T	F	T
tAI	M	T	T	F	T

4.3.48.3 Attribute constraints

None.

4.3.48.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

4.3.49 TAI <<dataType>>

4.3.49.1 Definition

This data type represents the properties describing the TAI of gNB, which is used to uniquely identify a Tracking Area.

4.3.49.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
pLMNId	M	T	T	F	T
nRTAC	M	T	T	F	T

4.3.49.3 Attribute constraints

None.

4.3.49.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

4.3.50 RimRSGlobal

4.3.50.1 Definition

This IOC is used to represent global/common Remote Interference Management (RIM) Reference Signal (RS) resource allocated for the whole network. Resource for RIM-RS transmission is defined by Sequence domain resource, Time domain resource and Frequency resource. The configure parameters of the RIM RS resource are applied to all Sets of RIM RS Resource across gNBs/cells in the network.

4.3.50.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
frequencyDomainPara	M	T	T	F	T
sequenceDomainPara	M	T	T	F	T
timeDomainPara	M	T	T	F	T

4.3.50.3 Attribute constraints

None.

4.3.50.4 Notifications

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

4.3.51 FrequencyDomainPara <<dataType>>

4.3.51.1 Definition

This data type defines configuration parameters of frequency domain resource to support RIM RS.

4.3.51.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
rimRSSubcarrierSpacing	M	T	T	F	T
rIMRSBandwidth	M	T	T	F	T
nrofGlobalRIMRSFrequencyCandidates	M	T	T	F	T
rimRSCommonCarrierReferencePoint	M	T	T	F	T
rimRSStartingFrequencyOffsetIdList	M	T	T	F	T

4.3.51.3 Attribute constraints

None.

4.3.51.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

4.3.52 SequenceDomainPara <<dataType>>

4.3.52.1 Definition

This data type defines configuration parameters of sequence domain resource to support RIM RS.

4.3.52.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
nrofRIMRSSequenceCandidatesofRS1	M	T	T	F	T
rimRSScrambleIdListofRS1	M	T	T	F	T
nrofRIMRSSequenceCandidatesofRS2	O	T	T	F	T
rimRSScrambleIdListofRS2	O	T	T	F	T
enableEnoughNotEnoughIndication	M	T	T	F	T
RIMRSScrambleTimerMultiplier	M	T	T	F	T
RIMRSScrambleTimerOffset	M	T	T	F	T

4.3.52.3 Attribute constraints

None.

4.3.52.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

4.3.53 TimeDomainPara <<dataType>>

4.3.53.1 Definition

This data type defines configuration parameters of time domain resource to support RIM RS.

4.3.53.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
dlULSwitchingPeriod1	M	T	T	F	T
symbolOffsetOfReferencePoint1	M	T	T	F	T
dlULSwitchingPeriod2	O	T	T	F	T
symbolOffsetOfReferencePoint2	O	T	T	F	T
totalnrofSetIdofRS1	M	T	T	F	T
totalnrofSetIdofRS2	O	T	T	F	T
nrofConsecutiveRIMRS1	M	T	T	F	T
nrofConsecutiveRIMRS2	O	T	T	F	T
consecutiveRIMRS1List	M	T	T	F	T
consecutiveRIMRS2List	M	T	T	F	T
enablenearfarIndicationRS1	O	T	T	F	T
enablenearfarIndicationRS2	O	T	T	F	T

4.3.53.3 Attribute constraints

None.

4.3.53.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

4.3.54 RimRSReportConf <<dataType>>

4.3.54.1 Definition

This data type defines RIM-RS reporting configuration.

4.3.54.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
reportIndicator	M	T	T	F	T
reportInterval	M	T	T	F	T
nrofRIMRSReportInfo	M	T	T	F	T
maxPropagationDelay	O	T	T	F	T
RimRSReportInfoList	M	T	T	F	T

4.3.54.3 Attribute constraints

None.

4.3.54.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

4.3.55 RimRSReportInfo <<dataType>>

4.3.55.1 Definition

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).

4.3.55.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
detectedSetID	M	T	T	F	T
propagationDelay	O	T	T	F	T
functionalityOfRIMRS	M	T	T	F	T

4.3.55.3 Attribute constraints

None.

4.3.55.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

4.3.56 RimRSSet

4.3.56.1 Definition

This IOC is used to represent aggressor or victim Set organized by OAM. The RIM RS Resource is assigned to each Set, which is identified by triple indices set of <Time domain index, Frequency domain index, and Sequence index >. The triple indices set can be derived by setId attribute (See subclause 7.4.1.6 in TS 38.211 [32]).

4.3.56.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
setId	M	T	T	F	T
setType	M	T	T	F	T
rimRSMonitoringStartTime	O	T	T	F	T
rimRSMonitoringStopTime	O	T	T	F	T
rimRSMonitoringWindowDuration	O	T	T	F	T
rimRSMonitoringWindowStartingOffset	O	T	T	F	T
rimRSMonitoringWindowPeriodicity	O	T	T	F	T
rimRSMonitoringOccasionInterval	O	T	T	F	T
rimRSMonitoringOccasionStartingOffset	O	T	T	F	T
Attribute related to role					
nRCellDURef	M	T	F	F	T

4.3.56.3 Attribute constraints

None.

4.3.56.4 Notifications

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

4.3.57 DANRManagementFunction

4.3.57.1 Definition

This IOC contains attributes to support the D-SON function of ANR Management (See clause 6.4.1.3 in TS 28.313 [57]).

4.3.57.2 Attributes

The DANRManagementFunction 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
intrasystemANRManagementSwitch	M	T	T	F	T
intersystemANRManagementSwitch	M	T	T	F	T

4.3.57.3 Attribute constraints

None.

4.3.57.4 Notifications

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

4.3.58 DESManagementFunction

4.3.58.1 Definition

This IOC represents the management capabilities of Distributed SON or Domain-Centralized SON Energy Saving (ES) functions. This is provided for Energy Saving purposes.

NOTE: 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.

4.3.58.2 Attributes

The DESManagementFunction 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
desSwitch	M	T	T	F	T
intraRatEsActivationOriginalCellLoadParameters	CM	T	T	F	T
intraRatEsActivationCandidateCellsLoadParameters	CM	T	T	F	T
intraRatEsDeactivationCandidateCellsLoadParameters	CM	T	T	F	T
esNotAllowedTimePeriod	O	T	T	F	T
interRatEsActivationOriginalCellParameters	CM	T	T	F	T
interRatEsActivationCandidateCellParameters	CM	T	T	F	T
interRatEsDeactivationCandidateCellParameters	CM	T	T	F	T
energySavingState	M	T	F	F	T
isProbingCapable	O	T	F	F	T

4.3.58.3 Attribute constraints

Name	Definition
intraRatEsActivationOriginalCellLoadParameters Support Qualifier	The condition is "Intra-RAT ESM is supported AND the cell acts as an original cell".
intraRatEsActivationCandidateCellsLoadParameters Support Qualifier	The condition is "Intra-RAT ESM is supported AND the cell acts as a candidate cell".
intraRatEsDeactivationCandidateCellsLoadParameters Support Qualifier	The condition is "Intra-RAT ESM is supported AND the cell acts as a candidate cell".
interRatEsActivationOriginalCellParameters CM Support Qualifier	The condition is "The cell acts as an original cell" AND inter-RAT ESM is supported.
interRatEsActivationCandidateCellParameters CM Support Qualifier	The condition is "The cell acts as a candidate cell" AND inter-RAT ESM is supported.
interRatEsDeactivationCandidateCellParameters CM Support Qualifier	The condition is "The cell acts as a candidate cell" AND inter-RAT ESM is supported.

4.3.58.4 Notification

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

4.3.59 DRACHOptimizationFunction

4.3.59.1 Definition

This IOC contains attributes to support the D-SON function of RACH optimization (See clause 7.1.1 in TS 28.313 [57]).

NOTE: in the case where multiple DRACHOptimization MOIs exist at different levels of the containment tree, the DRACHOptimization MOI at the lower level overrides the DRACHOptimization MOIs at higher level(s) of the same containment tree.

4.3.59.2 Attributes

The DRACHOptimizationFunction 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
ueAccProbilityDistPerSSB	M	T	T	F	T
ueAccDelayProbilityDistPerSSB	M	T	T	F	T
drachOptimizationControl	M	T	T	F	T

4.3.59.3 Attribute constraints

None.

4.3.59.4 Notifications

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

4.3.60 DMROFunction

4.3.60.1 Definition

This IOC contains attributes to support the D-SON function of MRO (See clause 7.1.2 in TS 28.313 [57]).

NOTE: 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.

4.3.60.2 Attributes

The DMROFunction 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
dmroControl	M	T	T	F	T
maximumDeviationHoTrigger	M	T	T	F	T
minimumTimeBetweenHoTriggerChange	M	T	T	F	T
tstoreUEcntxt	M	T	T	F	T

4.3.60.3 Attribute constraints

None.

4.3.60.4 Notifications

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

4.3.61 DPCIConfigurationFunction

4.3.61.1 Definition

This IOC contains attributes to support the Distributed SON or Domain-Centralized SON function of PCI configuration (See clause 7.1.3 in TS 28.313 [57]).

NOTE: 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.

4.3.61.2 Attributes

The DPCIConfigControlFunction 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
dPciConfigurationControl	M	T	T	F	T
nRPciList	M	T	T	F	T

4.3.61.3 Attribute constraints

None.

4.3.61.4 Notifications

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

4.3.62 CPCIConfigurationFunction

4.3.62.1 Definition

This IOC contains attributes to support the Cross Domain-Centralized SON function of PCI configuration (See clause 7.1.3 in TS 28.313 [57]).

NOTE: 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.

4.3.62.2 Attributes

The CPCIConfigurationFunction 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
cPciConfigurationControl	M	T	T	F	T
cSonPciList	M	T	T	F	T

4.3.62.3 Attribute constraints

None.

4.3.62.4 Notifications

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

4.3.63 CESManagementFunction

4.3.63.1 Definition

This IOC represents the management capabilities of Cross Domain-Centralized SON Energy Saving (ES) functions. This is provided for Energy Saving purposes.

NOTE: in the case where multiple CESManagement MOIs exist at different levels of the containment tree, the CESManagement MOI at the lower level overrides the ESManagement MOIs at higher level(s) of the same containment tree.

4.3.63.2 Attributes

The CESManagementFunction 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
cesSwitch	M	T	T	F	T
energySavingControl	M	T	T	F	T
energySavingState	M	T	T	F	T

4.3.63.3 Attribute constraints

None.

4.3.63.4 Notification

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

4.3.64 AddressWithVlan <<dataType>>

4.3.64.1 Definition

This data type represents the address including IP address and VLAN Id (e.g. localAddress of EP_NgC) used for initialization of the underlying transport.

4.3.64.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
iPAddress	O	T	T	F	T
vLANId	O	T	T	F	T

4.3.64.3 Attribute constraints

None

4.3.64.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

4.4 Attribute definitions

4.4.1 Attribute properties

Attribute Name	Documentation and Allowed Values	Properties
administrativeState	It indicates the administrative state of the NRCellDU. It describes the permission to use or prohibition against using the cell, imposed through the OAM services. allowedValues: LOCKED, SHUTTING DOWN, UNLOCKED. The meaning of these values is as defined in ITU-T Recommendation X.731 [18]. See Annex A for Relation between the "Pre-operation state of the gNB-DU Cell" and administrative state relevant in case of 2-split and 3-split deployment scenarios.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: LOCKED isNullable: False
operationalState	It indicates the operational state of the NRCellDU instance. It describes whether the resource is installed and partially or fully operable (Enabled) or the resource is not installed or not operable (Disabled). allowedValues: ENABLED, DISABLED.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
cellState	It indicates the usage state of the NRCellDU instance. It describes whether the cell is not currently in use (Idle), or currently in use but not configured to carry traffic (Inactive) or is currently in use and is configured to carry traffic (Active). The Inactive and Active definitions are in accordance with TS 38.401 [4]: "Inactive: the cell is known by both the gNB-DU and the gNB-CU. The cell shall not serve UEs; Active: the cell is known by both the gNB-DU and the gNB-CU. The cell should be able to serve UEs." "allowedValues: IDLE, INACTIVE, ACTIVE.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
arfcnDL	NR Absolute Radio Frequency Channel Number (NR-ARFCN) for downlink allowedValues: See TS 38.104 [12] subclause 5.4.2. Note that allowed values of NR-ARFCN are specified for each band in subclause 5.4.2.3.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
arfcnUL	NR Absolute Radio Frequency Channel Number (NR-ARFCN) for uplink allowedValues: See TS 38.104 [12] subclause 5.4.2. Note that allowed values of NR-ARFCN are specified for each band in subclause 5.4.2.3.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
arfcnSUL	NR Absolute Radio Frequency Channel Number (NR-ARFCN) for supplementary uplink allowedValues: See TS 38.104 [12] subclause 5.4.2. Note that allowed values of NR-ARFCN are specified for each band in subclause 5.4.2.3.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
beamAzimuth	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. See subclauses 3.2 in TS 38.104 [12] and 7.3 in TS 38.901 [53] as well as TS 28.662 [11]. 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. allowedValues: [-1800 ..1800] 0.1 degree	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Null isNullable: True

beamHorizWidth	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. See subclauses 3.2 in TS 38.104 [12] and 7.3 in TS 38.901 [53]. allowedValues: [0..3599] 0.1 degree	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Null isNullable: True
beamIndex	Index of the beam. For example, please see subclause 6.6.2 of TS 38.331 [54] where the ssb-Index in the rsIndexResults element of MeasResultNR is defined.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Null isNullable: True
beamTilt	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. See subclauses 3.2 in TS 38.104 [12] and 7.3 in TS 38.901 [53] as well as TS 28.662 [11]. 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. allowedValues: [-900..900] 0.1 degree	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Null isNullable: True
beamType	The type of the beam. allowedValues: "SSB-BEAM"	type: string multiplicity: 0..1 isOrdered: N/A isUnique: N/A defaultValue: Null isNullable: True
beamVertWidth	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. See subclauses 3.2 in TS 38.104 [12] and 7.3 in TS 38.901 [53]. allowedValues: [0...1800] 0.1 degree	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Null isNullable: True
bSChannelBwDL	BS Channel BW in MHz. for downlink allowedValues: See BS Channel BW in TS 38.104 [12], subclause 5.3.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
bSChannelBwUL	BS Channel BW in MHz.for uplink allowedValues: See BS Channel BW in TS 38.104 [12], subclause 5.3.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
bSChannelBwSUL	BS Channel BW in MHz.for supplementary uplink allowedValues: See BS Channel BW in TS 38.104 [12], subclause 5.3.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
configuredMaxTxPower	This is the maximum transmission power in milliwatts (mW) at the antenna port for all downlink channels, used simultaneously in a cell, added together. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

configuredMaxTxEIRP	This is the maximum emitted isotroptic radiated power (EIRP) in dBm for all downlink channels, used simultaneously in a cell, added together [12]. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
coverageShape	Identifies the sector carrier coverage shape described by the envelope of the contained SSB beams. The coverage shape is implementation dependent. allowedValues: 0 : 65535	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
digitalTilt	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. allowedValues: [-900..900] 0.1 degree	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
digitalAzimuth	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. allowedValues: [-1800 ..1800] 0.1 degree	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
cyclicPrefix	Cyclic prefix as defined in TS 38.211 [32], subclause 4.2. allowedValues: NORMAL, EXTENDED.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
localAddress	This parameter specifies the localAddress used for initialization of the underlying transport. The AddressWithVlan <dataType> is defined in clause 4.3.64.	type: AddressWithVlan multiplicity: 1 isOrdered: False isUnique: N/A defaultValue: None isNullable: False
AddressWithVlan.iPaddress	This parameter specifies the 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: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
AddressWithVlan. vlanId	This parameter specifies the local VLAN Id (See IEEE 802.1Q [39]) used for initialization of the underlying transport.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: 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: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

gNBId	It identifies a gNB within a PLMN. The gNB ID is part of the NR Cell Identifier (NCI) of the gNB cells. See "gNB Identifier (gNB ID)" of subclause 8.2 of TS 38.300 [3]. See "Global gNB ID" in subclause 9.3.1.6 of TS 38.413 [5]. allowedValues: 0..4294967295	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
gNBIdLength	This indicates the number of bits for encoding the gNB ID. See "Global gNB ID" in subclause 9.3.1.6 of TS 38.413 [5]. allowedValues: 22 .. 32.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
gNBDUId	It uniquely identifies the DU at least within a gNB-CU. See 'gNB-DU ID' in subclause 9.3.1.9 of 3GPP TS 38.473 [8]. allowedValues: $0..2^{36}-1$	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
gNBCUUPId	It uniquely identifies the gNB-CU-UP at least within a gNB-CU-CP. See 'gNB-CU-UP ID' in subclause 9.3.1.15 of 3GPP TS 38.463 [48]. allowedValues: $0..2^{36}-1$	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
gNBCUName	It identifies the Central Entity of a NR node, see subclause 9.2.1.4 of 3GPP TS 38.473 [8]. allowedValues: Not applicable	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
gNBDUName	It identifies the Distributed Entity of a NR node, see subclause 9.2.1.5 of 3GPP TS 38.473 [8]. allowedValues: Not applicable	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
cellLocalId	It identifies a NR cell of a gNB. It, together with the gNB Identifier (using gNBId of the parent GNBCUCPFunction or GNBDUFunction or ExternalCUCPFunction), identifies a NR cell within a PLMN. This is the NR Cell Identity (NCI). See subclause 8.2 of TS 38.300 [3]. The NCI can be constructed by encoding the gNB Identifier using gNBId (of the parent GNBCUCPFunction or GNBDUFunction or ExternalCUCPFunction) and cellLocalId where the gNB Identifier field is of length specified by gNBIdLength (of the parent GNBCUCPFunction or GNBDUFunction or ExternalCUCPFunction). See "Global gNB ID" in subclause 9.3.1.6 of TS 38.413 [5]. The NR Cell Global identifier (NCGI) is constructed from the PLMN identity the cell belongs to and the NR Cell Identifier (NCI) of the cell. See relation between NCI and NCGI subclause 8.2 of TS 38.300 [3]. allowedValues: Not applicable	type: Integer multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: None isNullable: False

nRPCI	This holds the Physical Cell Identity (PCI) of the NR cell. allowedValues: See 3GPP TS 36.211 subclause 6.11 for legal values of pci.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nRTAC	This holds the 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 [13] and Extended-TAC is defined in subclause 9.3.1.29 of 3GPP TS 38.473 [8]. d) For a 5G SA (Stand Alone), it has a non-null value.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: NULL isNullable: True
GNBCUCPFunction.pLMNId	It specifies the PLMN identifier to be used as part of the global RAN node identity. allowedValues: Not applicable.	Type: PLMNId multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
GNBCUUPFunction.pLMNIdList	This is a list of PLMN identifiers. It defines from which set of PLMNs an UE must have as its serving PLMN to be allowed to use the GNB-CU-UP. allowedValues: Not applicable.	type: PLMNId multiplicity: 1..12 isOrdered: N/A isUnique: True defaultValue: None isNullable: False
NRCellCU.pLMNInfoList	It defines which PLMNs that can be served by the NR cell,and which S-NSSAIs can be supported by the NR cell for corresponding PLMN in case of network slicing feature is supported allowedValues: Not applicable.	type: PLMNInfo multiplicity: 1..* isOrdered: N/A isUnique: True defaultValue: None isNullable: False
NRCellDU.pLMNInfoList	It defines which PLMNs that can be served by the NR cell, and which S-NSSAs 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. allowedValues: Not applicable.	type: PLMNInfo multiplicity: 1..* isOrdered: N/A isUnique: True defaultValue: None isNullable: False
ExternalNRCellCU.pLMNIdList	It 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. allowedValues: Not applicable.	Type: PLMNId multiplicity: 1..12 isOrdered: N/A isUnique: True defaultValue: None isNullable: False
rRMPolicyMemberList	It represents the list of RRMPolicyMember (s) that the managed object is supporting. A RRMPolicyMember <<dataType>> include the PLMNId <<dataType>> and S-NSSAI <<dataType>>. allowedValues: N/A	type: RRMPolicyMember multiplicity: 1..* isOrdered: N/A isUnique: True defaultValue: None isNullable: False

resourceType	The resource type of interest for an RRM Policy. allowedValues: PRB (for NRCellDU) RRC connected users (for NRCellCU) DRB (for GNBCUUPFunction) See NOTE 2, NOTE 3 and NOTE 4	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
sNSSAIList	It represents the list of S-NSSAI the managed object is supporting. The S-NSSAI is defined in 3GPP TS 23.003 [13]. allowedValues: See 3GPP TS 23.003 [13]	type: S-NSSAI multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
sST	This attribute specifies the Slice/Service type (SST) of the network slice. See clause 5.15.2 of 3GPP TS 23.501 [2].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
sD	This attribute specifies the Slice Differentiator (SD), which is optional information that complements the slice/service type(s) to differentiate amongst multiple Network Slices. See clause 5.15.2 of 3GPP TS 23.501 [2].	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
rRMPolicyMaxRatio	This attribute specifies the maximum percentage of radio resources that can be used by the associated rRMPolicyMemberList. The maximum percentage of radio resources 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 MangedEntity can be greater than 100. Default value: 100 allowedValues: 0 : 100	type: Integer multiplicity: isOrdered: N/A isUnique: N/A defaultValue: True allowedValues: N/A isNullable: False
rRMPolicyMinRatio	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 RRMPolicyRatio(s) name-contained by same MangedEntity shall be less or equal 100. Default value: 0 allowedValues: 0 : 100 NOTE: Void.	type: Integer multiplicity: isOrdered: N/A isUnique: N/A defaultValue: True allowedValues: N/A isNullable: False

rRMPolicyDedicatedRatio	This attribute specifies the percentage of radio resource that dedicatedly used by the associated rRMPolicyMemberList. The sum of the 'rRMPolicyDedicatedRatio' values assigned to all RRMPolicyRatio(s) name-contained by same MangedEntity shall be less or equal 100. Default value: 0 allowedValues:0 : 100	type: Integer multiplicity: isOrdered: N/A isUnique: N/A defaultValue: TRUE allowedValues: N/A isNullable: False
subCarrierSpacing	Subcarrier spacing configuration for a BWP. See subclause 5 in TS 38.104 [12]. AllowedValues: [15, 30, 60, 120] depending on the frequency range FR1 or FR2.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
txDirection	Indicates if the transmission direction is downlink (DL), uplink (UL) or both downlink and uplink (DL and UL). allowedValues: DL, UL, DL and UL	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
bwpContext	It identifies whether the object is used for downlink, uplink or supplementary uplink. allowedValues: DL, UL, SUL	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
isInitialBwp	It identifies whether the object is used for initial or other BWP. allowedValues: INITIAL, OTHER	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
startRB	Offset in common resource blocks to common resource block 0 for the applicable subcarrier spacing for a BWP. This corresponds to N_BWP_start, see subclause 4.4.5 in TS 38.211 [32]. allowedValues: 0 to N_grid_size – 1, where N_grid_size equals the number of resource blocks for the BS channel bandwidth, given the subcarrier spacing of the BWP.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
numberOfRBs	Number of physical resource blocks for a BWP. This corresponds to N_BWP_size, see subclause 4.4.5 in TS 38.211 [32]. allowedValues: 1 to N_grid_size – startRB of the BWP. Se startRB for definition of N_grid_size.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nRTCI	This is the Target NR Cell Identifier. It consists of NR Cell Identifier (NCI) and Physical Cell Identifier of the target NR cell (nRPCI). The NRRelation.nRTCI identifies the target cell from the perspective of the NRCell, the name-containing instance of the subject NRCellCU instance. allowedValues: Not applicable.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

adjacentCellRef	This attribute contains the DN of an adjacentNRCell (NRCellCU or ExternalNRCellCU) allowedValues: Not applicable.	type: DN multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: None isNullable: False
ssbFrequency	Indicates cell defining SSB frequency domain position Frequency of the cell defining SSB transmission. The frequency provided in this attribute 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 TS 38.101-1 [42] subclause 5.4.2. and within bSChannelBwDL. allowedValues: 0..3279165	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nRFrequencyRef	This attribute contains the DN of the referenced NRFrequency. allowedValues: Not applicable.	type: DN multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: None isNullable: False
nRSectorCarrierRef	This attribute contains the DN of the referenced NRSectorCarrier. allowedValues: Not applicable.	type: DN multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: None isNullable: False
bWPRef	This attribute contains the DN of the referenced BWP. allowedValues: Not applicable.	type: DN multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: None isNullable: False
sectorEquipmentFunctionRef	This attribute contains the DN of the referenced NSectorEquipmentFunction. allowedValues: Not applicable.	type: DN multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: None isNullable: False
offsetMO	It is a list of offset values applicable to all measured cells with reference signal(s) indicated in this *MeasObjectNR*. See offsetMO of subclause 5.5.4 of TS 38.331 [54]. allowedValues: Not applicable.	type: QOffsetRangeList multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False
cellIndividualOffset	It is a list of offset values for the neighbour cell. Used when UE is in connected mode. The unit is 1dB. It is defined for rsrpOffsetSSB, rsrqOffsetSSB, sinrOffsetSSB, rsrpOffsetCSI-RS, rsrqOffsetCSI-RS and sinrOffsetCSI-RS. See TS 38.331 [54]. allowedValues: Not applicable.	type: Integer multiplicity: 6 isOrdered: True isUnique: N/A defaultValue: 0 isNullable: False
blackListEntry	It specifies a list of PCI (physical cell identity) that are blacklisted in EUTRAN measurements as described in 3GPP TS 38.331 [54]. allowedValues: { 0…1007 }	type: Integer multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

blackListEntryIdleMode	It specifies a list of PCI (physical cell identity) that are blacklisted in SIB4 and SIB5. allowedValues: { 0…1007 }	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
cellReselectionPriority	It is the absolute priority of the carrier frequency used by the cell reselection procedure. See *CellReselectionPriority* IE in TS 38.331 [54]. It corresponds to the parameter priority in 3GPP TS 38.304 [49]. Value 0 means lowest priority. The UE behaviour when no value is entered is specified in subclause 5.2.4.1 of 3GPP TS 38.304 [49]. The value must not already used by other RAT, i.e. equal priorities between RATs are not supported. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: 0None isNullable: False
cellReselectionSubPriority	It 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. See *CellReselectionSubPriority* IE in TS 38.331 [54]. allowedValues: { 0.2, 0.4, 0.6, 0.8 }.	type: Float multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
pMax	It calculates the parameter Pcompensation (defined in 3GPP TS 38.304 [49]), at cell reselection to an Cell. Its unit is 1 dBm. It corresponds to parameter PEMAX in 3GPP TS 38.101-1 [42]. allowedValues: { -30..33 }.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
qOffsetFreq	It is the frequency specific offset applied when evaluating candidates for cell reselection.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: 0 isNullable: False
qOffsetRangeList	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. The value in dB. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on. This is a list of enum values representing, in sequence: rsrpOffsetSSB, rsrqOffsetSSB, sinrOffsetSSB, rsrpOffsetCSI-RS, srqOffsetCSI-RS, sinrOffsetCSI-RS. See Q-OffsetRangeList in subclause of subclause 6.3.1 of TS 38.331 [54]. allowedValues: { -24, -22, -20, -18, -16, -14, -12, -10, -8, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24 }	type: ENUM multiplicity: 6 isOrdered: True isUnique: N/A defaultValue: 0 isNullable: False

qQualMin	It indicates the minimum required quality level in the cell (dB). See qQualMin in TS 38.304 [49]. Unit is 1 dB. 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. allowedValues: { -34..-3, 0 }	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
qRxLevMin	It indicates the required minimum received Reference Symbol Received Power (RSRP) level in the (E-UTRA) frequency for cell reselection. It corresponds to Qrxlevmin defined in 3GPP TS 38.304 [49]. It is broadcast in SIB3 or SIB5, depending on whether the related frequency is intra- or inter-frequency. Its unit is 1 dBm and resolution is 2. allowedValues: { -140..-44 }.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
threshXHighP	This specifies the Srxlev threshold (in dB) 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. It corresponds to the $Thresh_{X, HighP}$ in 3GPP TS 38.304 [49]. Its unit is 1 dB and resolution is 2. allowedValues: { 0..62 }	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
threshXHighQ	This specifies the Squal threshold (in dB) 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. It corresponds to the ThreshX, HighQ in TS 38.304 [49]. Its unit is 1 dB. allowedValues: { 0..31 }	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
threshXLowP	This specifies the Srxlev threshold (in dB) used by the UE when reselecting towards a lower priority RAT/ frequency than the current serving frequency. Each frequency of NR might have a specific threshold. It corresponds to ThreshX,LowP in 3GPP TS 38.304 [49]. Its unit is 1 dB. Its resolution is 2. allowedValues: { 0..62 }	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
threshXLowQ	This specifies the Squal threshold (in dB) used by the UE when reselecting towards a lower priority RAT/ frequency than the current serving frequency. Each frequency of NR might have a specific threshold. It corresponds to ThreshX,Low in TS 38.304 [49]. Its unit is 1 dB. allowedValues: {0..31}.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
tReselectionNr	It is the cell reselection timer and corresponds to parameter TreselectionRAT for NR defined in 38.331 [54]. Its unit is in seconds. allowedValues: {0..7}.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

tReselectionNRSfHigh	The attribute t-ReselectionNr (a parameter $Treselection_{NR}$ in TS 38.304 [49]) is multiplied with this factor if the UE is in high mobility state. It corresponds to the parameter Speed dependent ScalingFactor for TreselectionNr for medium high state in 3GPP TS 38.304 [49]. The unit is one %. Value mapping: 25 = 0.25 50 = 0.5 75 = 0.75 100 = 1.0 allowedValues: {25, 50, 75, 100}.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
tReselectionNRSfMedium	The attribute t-ReselectionNR (a parameter "$Treselection_{NR}$ in TS 38.304 [49]") is multiplied with this factor if the UE is in medium mobility state. It corresponds to the parameter Speed dependent ScalingFactor for TreselectionNr for medium mobility state in 3GPP TS 38.304 [49]. Its unit is one %. Value mapping: 25 = 0.25 50 = 0.5 75 = 0.75 100 = 1.0 allowedValues: {25, 50, 75, 100}.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
absoluteFrequencySSB	The absolute frequency applicable for a downlink NR carrier frequency associated with the SSB. allowedValues: {0.. 3279165}.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
sSBSubCarrierSpacing	This SSB is used for for synchronization. See subclause 5 in TS 38.104 [12]. Its units are in kHz. allowedValues: {15, 30, 120, 240}. Note that the allowed values of SSB used for representing data, by e.g. a BWP, are: 15, 30, 60 and 120 in units of kHz.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
multiFrequencyBandListNR	It is a list of additional frequency bands the frequency belongs to. The list is automatically set by the gNB. allowedValues: {1..256 }	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
ssbPeriodicity	Indicates cell defined SSB periodicity in number of subframes (ms). The SSB periodicity in msec is used for the rate matching purpose. allowedValues: 5, 10, 20, 40, 80, 160.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

ssbOffset	Indicates cell defining SSB time domain position. Defined as the offset of the measurement window, in number of subframes (ms), in which to receive SS/PBCH blocks, where allowed values depend on the ssbPeriodicity. allowedValues: ssbPeriodicity5 ms 0..4, ssbPeriodicity10 ms 0..9, ssbPeriodicity20 ms 0..19, ssbPeriodicity40 ms 0..39, ssbPeriodicity80 ms 0..79, ssbPeriodicity160 ms 0..159.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
ssbDuration	Duration of the measurement window in which to receive SS/PBCH blocks. It is given in number of subframes (ms) (see 38.213 [41], subclause 4.1. allowedValues: 1, 2, 3, 4, 5.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
rimRSMonitoringStartTime	This field configures the UTC time when the gNB attempts to start RIM-RS monitoring. allowedValues: containing the information same with xsd: dateTime.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
rimRSMonitoringStopTime	This field configures the UTC time when the gNB stops RIM-RS monitoring. allowedValues: containing the information same with xsd: dateTime.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
mappingSetIDBackhaulAddressList	The attribute specifies a list of mappingSetIDBackhaulAddress which is defined as a datatype (see clause 4.3.47). Which is used to retrieve the backhaul address of the victim set. allowedValues: Not applicable	type: MappingSetIDBackhaulAddress multiplicity: 1..* isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
backhaulAddress	The attribute specifies backhaulAddress which is defined as a datatype (see clause 4.3.48). allowedValues: Not applicable	type: BackhaulAddress multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
setID	This specifies the set ID of a victim Set (RIM-RS1 Set) or aggressor Set (RIM-RS2 set). (See subclause 7.4.1.6 in TS 38.211 [32]). allowedValues: The bit length of the set ID is maximum 22bit.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
tAI	Indicates the TAI (see subclause 9.3.3.11 in TS 38.413[5]), including pLMNId ID and nRTAC. allowedValues: Not applicable	type: TAI multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

isRemoveAllowed	This indicates if the subject NRCellRelation can be removed (deleted) or not. If TRUE, the subject NRCellRelation instance can be removed (deleted). If FALSE, the subject NRCellRelation instance shall not be removed (deleted) by any entity but an MnS consumer. allowedValues: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
isHOAllowed	This indicates if HO is allowed or prohibited. If TRUE, 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 FALSE, handover shall not be allowed. allowedValues: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
intrasystemANRManagementSwitch	This attribute determines whether the intra-system ANR function is activated or deactivated. If “TRUE”, 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 “FALSE”, 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: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
intersystemANRManagementSwitch	This attribute determines whether the inter-system ANR function is activated or deactivated. If “TRUE”, 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 “FALSE”, 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: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
desSwitch	This attribute determines whether the Distributed SON or Domain-Centralized SON energy saving function is enabled or disabled. allowedValues: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
cesSwitch	This attribute determines whether the Cross Domain-Centralized SON energy saving function is enabled or disabled. allowedValues: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
energySavingControl	This attribute allows the Cross Domain-Centralized SON energy saving function to initiate energy saving activation or deactivation. allowedValues: toBeEnergySaving, toBeNotEnergySaving	type: enumeration multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True

energySavingState	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. allowedValues: isNotEnergySaving, isEnergySaving.	type: enumeration multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
intraRatEsActivationOriginalCellLoadParameters	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. allowedValues: Threshold: Integer 0..100 (Percentage of PRB usage, see 3GPP TS 36.314 [13]) TimeDuration: Integer (in unit of seconds)	type: data type multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
intraRatEsActivationCandidateCellsLoadParameters	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 a n '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. allowedValues: Threshold: Integer 0..100 (Percentage of PRB usage (see 3GPP TS 36.314 [13])) TimeDuration: Integer (in unit of seconds)	type: data type multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
intraRatEsDeactivationCandidateCellsLoadParameters	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. allowedValues: Threshold: Integer 0..100 (Percentage of PRB usage (see 3GPP TS 36.314 [13])) TimeDuration: Integer (in unit of seconds)	type: data type multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True

esNotAllowedTimePeriod	This attribute can be used to prevent a cell entering energySaving state. This attribute indicates a list of time periods during which inter-RAT energy saving is not allowed. Time period is valid on the specified day and time of every week. allowedValues: The legal values are as follows: startTime and endTime: All values that indicate valid UTC time. endTime should be later than startTime. periodOfDay: structure of startTime and endTime. daysOfWeekList: list of weekday. weekday: Monday, Tuesday, … Sunday. List of time periods: {{ daysOfWeek daysOfWeekList, periodOfDay dailyPeriod}}	type: data type multiplicity: 0..* isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
interRatEsActivationOriginalCellParameters	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. allowedValues: LoadThreshold: Integer 0..10000 TimeDuration: Integer 0..900 (in unit of seconds)	type: data type multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True

interRatEsActivationCandidateCellParameters	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. allowedValues: LoadThreshold: Integer 0..10000 TimeDuration: Integer 0..900 (in unit of seconds)	type: data type multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
interRatEsDeactivationCandidateCellParameters	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. allowedValues: LoadThreshold: Integer 0..10000 TimeDuration: Integer 0..900 (in unit of seconds)	type: data type multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
isProbingCapable	This attribute indicates whether this cell is capable of performing the ES probing procedure. During this procedure the eNB owning the cell indicates its presence to UEs for measurement purposes, but prevents idle mode UEs from camping on the cell and prevents incoming handovers to the same cell. If this parameter is absent, then probing is not done. allowedValues: yes, no	type: enumeration multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
dmroControl	This attribute determines whether the MRO function is enabled or disabled. allowedValues: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
cSonPciList	This holds a list of physical cell identities that can be assigned to the pci attribute by gNB. The assignment algorithm is not specified. This attribute shall be supported if and only if the C-SON PCI configuration is supported. See TS 28.313, ref [57] subclause 7.1.3. allowedValues: See TS 38.211 [32] subclause 7.4.2.1 for legal values of pci. The number of pci in the list is 1 to 100X.	type: Integer multiplicity: 1..* isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

ueAccProbilityDistPerSSB	This is a list of target Access Probability (AP_n) for the RACH optimization function. Each instance AP_n of the list is the probability that the UE gets access on the RACH channel per SSB within *n* number of preambles sent over an unspecified sampling period. This target is suitable for RACH optimization. allowedValues: Each element of the list, $\boldsymbol{AP_n}$, is a pair (*a*, *n*) where *a* is the targetProbability (in %) and *n* is the number of preambles sent. The legal values for *a* are 25, 50, 75, 90. The legal values for *n* are 1 to 200. The number of elements specified is 4. The number of elements supported is vendor specific. The choice of supported values for *a* and *n* is vendor-specific.	type: data type multiplicity: 0..* isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
ueAccDelayProbilityDistPerSSB	This is a list of target Access Delay probability (AD_P) for the RACH optimization function. Each instance AD_P of the list is the target time before the UE gets access on the RACH channel per SSB, for the *P* percent of the successful RACH Access attempts with lowest access delay, over an unspecified sampling period. This target is suitable for RACH optimization. allowedValues: Each element of the list, $\boldsymbol{AD_p}$, is a pair (*p, d*) where *p* is the targetProbability (in %) and *d* is the access delay (in milliseconds). The legal values for *p* are 25, 50, 75, 90. The legal values for *d* are 10 to 560. The number of elements specified is 4. The number of elements supported is vendor specific. The choice of supported values for *a* and *b* is vendor-specific.	type: data type multiplicity: 0..* isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
drachOptimizationControl	This attribute determines whether the RACH Optimization function is enabled or disabled. allowedValues: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nRPciList	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 or domain Centralized SON PCI configuration function is supported. See subclause 8.2.3, 8.3.1 in TS 28.313 [57]. allowedValues: See TS 38.211 [32] subclause 7.4.2 for legal values of pci. The number of pci in the list is 0 to 1007.	type: Integer multiplicity: 1..* isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
dPciConfigurationControl	This attribute determines whether the Distributed SON or Domain-Centralized SON PCI configuration Function is enabled or disabled. allowedValues: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
cPciConfigurationControl	This attribute determines whether the Cross Domain-Centralized SON PCI configuration function is enabled or disabled. allowedValues: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

maximumDeviationHoTrigger	This parameter defines the maximum allowed absolute deviation of the Handover Trigger, from the default point of operation (see TS 38.300 [3] and TS 38.423 [58]). Editor's note: The subclause references to TS 38.300 and TS 38.423 will be added, when they are available. allowedValues: -20..20 Unit: 0.5 dB	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
minimumTimeBetweenHoTriggerChange	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 (see TS 38.300 [3]). Editor's note: The subclause references to TS 38.300 will be added, when they are available. allowedValues: 0..604800 Unit: Seconds	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tstoreUEcntxt	The timer used for detection of too early HO, too late HO and HO to wrong cell. Corresponds to Tstore_UE_cntxt timer described in TS 38.300 [3]. Editor's note: The subclause references to TS 38.300 will be added, when they are available. This attribute is used for Mobility Robustness Optimization. allowedValues: 0..1023 Unit: 100 milliseconds	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
configurable5QISetRef	This is the DN of Configurable5QISet. allowedValues: DN of the Configurable5QISet MOI.	type: String multiplicity: 0..1 isOrdered: False isUnique: True defaultValue: None isNullable: True
frequencyDomainPara	This attribute defines configuration parameters of frequency domain resource to support RIM RS. allowedValues: Not applicable.	type: FrequencyDomainPara multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
sequenceDomainPara	This attribute defines configuration parameters of sequence domain resource to support RIM RS. allowedValues: Not applicable.	type: SequenceDomainPara multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
timeDomainPara	This attribute defines configuration parameters of time domain resource to support RIM RS. allowedValues: Not applicable.	type: TimeDomainPara multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
rimRSSubcarrierSpacing	It is the subcarrier spacing configuration (μ) for the RIM-RS. Subcarrier spacing $\Delta f = 2^{\mu} \cdot 15\ kHz$. (see 38.211 [32], subclause 5.3.3). allowedValues: 0, 1	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

rIMRSBandwidth	It is RIM RS bandwidth configuration in number of PRBs (see 38.211 [32], subclause 5.3.3). For carrier bandwidth larger than 20MHz, this attributer should be 96 if subcarrier spacing is15kHz; 48 or 96 if subcarrier spacing is 30kHz; For carrier bandwidth smaller than or equal to 20MHz, this attributer should be Minimum of {96 , bandwidth of downlink carrier in number of PRBs} if subcarrier spacing is15kHz; Minimum of {48, bandwidth of downlink carrier in number of PRBs } if subcarrier spacing is 30kHz; allowedValues: 1,2..96	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nrOfGlobalRIMRSFrequencyCandidates	It is the number of candidate frequency resources in the whole network (N_f^{RIM}) (see 38.211 [32], subclause 7.4.1.6). allowedValues: 1,2,4	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
rimRSStartingFrequencyOffsetIdList	It is a list of configured frequency offsets in units of resource blocks, where each element is the frequency offset relative to a configured reference point for RIM-RS. The size of the list is nrofGlobalRIMRSFrequencyCandidates and the resulting frequency resource blocks of RIM-RS corresponding to different configured frequency offset have no overlapping bandwidth. (see 38.211 [32], subclause 7.4.1.6). . allowedValues: 0..maxNrofPhysicalResourceBlocks-1 where maxNrofPhysicalResourceBlocks = 550	type: Integer multiplicity: 1, 2, 4 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nrofRIMRSSequenceCandidatesofRS1	It is the number of candidate sequences assigned for RIM RS-1 ($N_s^{RIM,1}$) (see 38.211 [32], subclause 7.4.1.6). It should be even when enableEnoughNotEnoughIndication for RS-1 is ON allowedValues: 1,2..8	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
rimRSScrambleIdListofRS1	It is list of configured scrambling identities for RIM RS-1 (see 38.211 [32], subclause 7.4.1.6). The size of the list is nrofRIMRSSequenceCandidatesofRS1. allowedValues: 0..2^10-1	type: Integer multiplicity: 1, 2..8 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nrofRIMRSSequenceCandidatesofRS2	It is the number of candidate sequences assigned for RIM RS-2 (see 38.211 [32], subclause 7.4.1.6). allowedValues: 1,2..8	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
rimRSScrambleIdListofRS2	It is list of configured scrambling identities for RIM RS-2 (see 38.211 [32], subclause 7.4.1.6).. The size of the list is nrofRIMRSSequenceCandidatesofRS2. allowedValues: 0..2^10-1	type: Integer multiplicity: 1, 2..8 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

enableEnoughNotEnoughIndication	It is indication of whether “Enough” / “Not enough” indication functionality is enabled for RIM RS-1 (see 38.211 [32], subclause 7.4.1.6). If the indication is "enable", the first half of nrofRIMRSSequenceCandidatesofRS1 sequences indicates "Not enough mitigation", and the second half indicates "Enough mitigation", where, "Enough mitigation" indicates that IoT going back to certain level at victim side and/or no further interference mitigation actions are needed at aggressor side "Not enough mitigation" indicates that IoT exceeding certain level at victim side and/or further interference mitigation actions are needed at aggressor side allowedValues: "ENABLE", "DISABLE" see NOTE 8	type: Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: DISABLE isNullable: False
RIMRSScrambleTimerMultiplier	It is parameter multiplier factor Z for initialization seed (see 38.211 [32], subclause 7.4.1.6). allowedValues: 0,1,….2^31-1	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
RIMRSScrambleTimerOffset	It is parameter offset for initialization seed (see 38.211 [32], subclause 7.4.1.6). allowedValues: 0,1,….2^31-1	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

dlULSwitchingPeriod1	This attribute is used to configure the first uplink-downlink switching period (P1) for RIM RS transmission in the network, where one RIM RS is configured in one uplink-downlink switching period. (see 38.211 [32], subclause 7.4.1.6). When only one TDD-UL-DL-Pattern is configured, only dl-UL-SwitchingPeriod1 is configured, where P1 equals to the transmission periodicity of the TDD-UL-DL-Pattern. When two concatenated TDD-UL-DL-Patterns are configured, and RIM-RS resources is configured only in one of the TDD patterns, only dl-UL-SwitchingPeriod1 is configured, where P1 equals to the addition of the concatenated transmission periodicity of the two TDD-UL-DL-Patterns. When two concatenated TDD-UL-DL-Patterns are configured, and RIM-RS resources are configured in both TDD patterns, both dl-UL-SwitchingPeriod1 and dl-UL-SwitchingPeriod2 are configured, where P1 equals to the transmission periodicity of the first TDD-UL-DL-Pattern. See NOTE 6 allowedValues: MS0P5, MS0P625, MS1, MS1P25, MS2, MS2P5, MS4, MS5, MS10, MS20, if a single uplink-downlink period is configured for RIM-RS purposes; MS0P5, MS0P625, MS1, MS1P25, MS2, MS2P5, MS3, MS4, MS5, MS10, MS20, if two uplink-downlink periods are configured for RIM-RS purposes. see NOTE 9	type: Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
symbolOffsetOfReferencePoint1	This attribute is used to configure the reference point in the first uplink-downlink switching period, which is the symbols offset of the reference point after the starting boundary of the first uplink-downlink switching period. It's Configured together with dl-UL-SwitchingPeriod1 (see 38.211 [32], subclause 7.4.1.6). When only one TDD-UL-DL-Pattern is configured, the reference point configured for the first uplink-downlink switching period is the DL transmission boundary of the TDD-UL-DL-Pattern. When two concatenated TDD-UL-DL-Patterns are configured, and RIM-RS resources is configured only in one of the TDD patterns, the reference point configured for the first uplink-downlink switching period is the DL transmission boundary of the TDD-UL-DL-Pattern where the RIM-RS resource is configured. When two concatenated TDD-UL-DL-Patterns are configured, and RIM-RS resources are configured in both TDD patterns, the reference points configured for first uplink-downlink switching period is the DL transmission boundary of the first TDD-UL-DL-Pattern. allowedValues: 2, 3..20*2*maxNrofSymbols-1, where maxNrofSymbols=14	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

dlULSwitchingPeriod2	This attribute is used to configure the second uplink-downlink switching period (P2) for RIM RS transmission in the network, where one RIM RS is configured in one uplink-downlink switching period (see 38.211 [32], subclause 7.4.1.6). When two concatenated TDD-UL-DL-Patterns are configured, and RIM-RS resources are configured in both TDD patterns, both dl-UL-SwitchingPeriod1 and dl-UL-SwitchingPeriod2 are configured, where P2 equals to the transmission periodicity of the second TDD-UL-DL-Pattern, and where (P1 + P2) divides 20 ms. allowedValues: MS0P5, MS0P625, MS1, MS1P25, MS2, MS2P5, MS3, MS4, MS5, MS10, MS20 See NOTE 9	type: Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
symbolOffsetOfReferencePoint2	This attribute is used to configure the reference point in the second uplink-downlink switching period, which is the symbol offset of the reference point after starting boundary of the second uplink-downlink switching period. Configured together with dl-UL-SwitchingPeriod2 (see 38.211 [32], subclause 7.4.1.6). When two concatenated TDD-UL-DL-Patterns are configured, and RIM-RS resources are configured in both TDD patterns, the reference points configured for second uplink-downlink switching period is the DL transmission boundary of the second TDD-UL-DL-Pattern. allowedValues: 2, 3..20*2*maxNrofSymbols-1, where maxNrofSymbols=14	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
totalnrofSetIdofRS1	It is the total number of set IDs for RIM RS-1 ($N_{\mathrm{setID}}^{\mathrm{RIM},1}$) (see 38.211 [32], subclause 7.4.1.6). allowedValues: 0,1...2^22-1	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
totalnrofSetIdofRS2	It is the total number of set IDs for RIM RS-2 (see 38.211 [32], subclause 7.4.1.6). allowedValues: 0,1...2^22-1	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nrofConsecutiveRIMRS1	It is number of consecutive uplink-downlink switching periods for RS-1 (R1) for repetition/near-far indication:. (see 38.211 [32], subclause 7.4.1.6). allowedValues: 1,2,4,8 see NOTE 7	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nrofConsecutiveRIMRS2	It is number of consecutive uplink-downlink switching periods for RS-2 (R2) for repetition/near-far indication. (see 38.211 [32], subclause 7.4.1.6). allowedValues: 1,2,4,8 see NOTE 7	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

consecutiveRIMRS1List	It is used to configure the OFDM symbol position(s) of RIM RS-1 within the uplink-downlink switching period. It is a list of symbol offset of RIM RS-1 before the reference point. The size of the list is nrofConsecutiveRIMRS1 (see 38.211 [32], subclause 7.4.1.6). The resulting RIM RS-1 symbols and its reference point shall belong to the same 10ms frame. . allowedValues: 2,3..20*2*maxNrofSymbols-1, where maxNrofSymbols=14	type: Integer multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
consecutiveRIMRS2List	It is used to configure the OFDM symbol position(s) of RIM RS-2 within the uplink-downlink switching period. It is a list of symbol offset of RIM RS-2 before the reference point. The size of the list is nrofConsecutiveRIMRS2 (see 38.211 [32], subclause 7.4.1.6). The resulting RIM RS-2 symbols and its reference point shall belong to the same 10ms frame. . allowedValues: 2,3..20*2*maxNrofSymbols-1, where maxNrofSymbols=14	type: Integer multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
enablenearfarIndicationRS1	It is indication of whether near-far functionality is enabled for RIM RS1. If the indication is “enable”, the first half of nrofConsecutiveRIMRS1 (R1) consecutive uplink-downlink switching period is for "Near" indication with R1/2 repetitions, the second half of R1 consecutive uplink-downlink switching period is for "Far" indication with R1/2 repetitions. allowedValues: "ENABLE", "DISABLE"	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: DISABLE isNullable: False
enablenearfarIndicationRS2	It is indication of whether near-far functionality is enabled for RIM RS2. If the indication is “enable”, the first half of nrofConsecutiveRIMRS2 (R2) consecutive uplink-downlink switching period is for "Near" indication with R2/2 repetitions, the second half of R2 consecutive uplink-downlink switching period is for "Far" indication with R2/2 repetitions. allowedValues: "ENABLE", "DISABLE"	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: DISABLE isNullable: False
rimRSReportConf	It is used to configure gNBs to report the all necessary information derived from the detected RIM-RS to OAM. allowedValues: Not applicable	type: RimRSReportConf multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False

reportIndicator	It is 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. allowedValues: ENABLE, DISABLE	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: DISABLE isNullable: False
reportInterval	It is used to define reporting interval of a gNB in ms. allowedValues: Not applicable	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nrofRIMRSReportInfo	It is used to define the maximum number of RIMRSReportInfo in a single report. allowedValues: Not applicable	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
maxPropagationDelay	It is 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.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
rimRSReportInfoList	It represents a list (the length of the list is nrofRIMRSReportInfo) of necessary information derived from the detected RIM-RS. allowedValues: Not applicable	type: RimRSReportInfo multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False
detectedSetID	This attributer indicates the Set ID of the detected RIM-RS. allowedValues: 0,1...max{totalnrofSetIdofRS1, totalnrofSetIdofRS2}.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
propagationDelay	This attributer indicates the propagation delay of the detected RIM-RS, in number of OFDM symbol. allowedValues: 0, 1.. maxPropagationDelay.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
functionalityOfRIMRS	This attributer indicates the functionality of the detected RIM-RS. If the indication of enableEnoughNotEnoughIndication is "enable", valid values are {RS2, RS1forEnoughMitigation, RS1forNotEnoughMitigation}; If the indication of enableEnoughNotEnoughIndication is "disable", valid values are {RS1, RS2}. allowedValues: RS1, RS2, RS1forEnoughMitigation, RS1forNotEnoughMitigation	type: Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

rimRSMonitoringWindowDuration	This attributer 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 [32], 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). 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 $N_T = \begin{cases} \left\lceil \frac{N_{\text{setID}}^{\text{RIM},1}}{N_{\text{f}}^{\text{RIM}} N_{\text{s}}^{\text{RIM},1}} \right\rceil & \text{if enableEnoughNotEnoughIndication is "disable"} \\ \left\lceil \frac{2N_{\text{setID}}^{\text{RIM},1}}{N_{\text{f}}^{\text{RIM}} N_{\text{s}}^{\text{RIM},1}} \right\rceil & \text{if enableEnoughNotEnoughIndication is "enable"} \end{cases}$ $N_{\text{setID}}^{\text{RIM},1}$ is the total number of set IDs for RIM RS-1 (configured by totalnrofSetIdofRS1), $N_{\text{f}}^{\text{RIM}}$ is the number of candidate frequency resources in the whole network (configured by nrofGlobalRIMRSFrequencyCandidates), and $N_{\text{s}}^{\text{RIM},1}$ is the number of candidate sequences assigned for RIM RS-1 (configured by nrofRIMRSSequenceCandidatesofRS1). allowedValues: 1,2,..2^14	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
rimRSMonitoringWindowPeriodicity	This attributer configures the periodicity of the monitoring window, in unit of hours. allowedValues: 1, 2, 3, 4, 6, 8, 12, 24	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
rimRSMonitoringWindowStartingOffset	This attributer configures the start offset of the first monitoring window within one day, in unit of hours. allowedValues: 0,1,2..23	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

rimRSMonitoringOccasionInterval	This attributer 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.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
rimRSMonitoringOccasionStartingOffset	This attributer 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)	Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
victimSetRef	This attribute contains the DN of a victim Set (RimRSSet) allowedValues: Not applicable.	type: DN multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: None isNullable: False
aggressorSetRef	This attribute contains the DN of an aggressor Set (RimRSSet) allowedValues: Not applicable.	type: DN multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: None isNullable: False
setType	The attribute specifies type of a RIM-RS Set . RIM RS1 is transmitted by victim to indicate its suffering remote interference, and RIM RS2 is transmitted by aggressor to measure if Remote Interference still exist allowedValues: RS1, RS2.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nRCellDURef	This attribute contains the DN of a NR Cell (NRCellDU) allowedValues: Not applicable.	type: DN multiplicity: * isOrdered: N/A isUnique: True defaultValue: None isNullable: False
isENDCAllowed	This 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. allowedValues: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

x2BlackList	This is a list of GeNBIds. If the target node GeNBId is a member of the source node's NRCellCU.x2BlackList, the source node is: 1) prohibited from sending X2 connection requests to the target node; 2) forced to tear down an established X2 connection to the target node; 3) not allowed to accept incoming X2 connection requests from the target node. The same GeNBId may appear here and in NRCellCU.x2WhiteList. In such case, the GeNBId in x2WhiteList shall be treated as if it is absent. allowedValues: See NOTE 5.	type: String multiplicity: 0..* isOrdered: False isUnique: True defaultValue: None isNullable: False
xnBlackList	This is a list of GgNBIds. If the target node GgNBId is a member of the source node's NRCellCU.xnBlackList, the source node is: 1) prohibited from sending Xn connection requests to the target node; 2) forced to tear down an established Xn connection to the target node; 3) not allowed to accept incoming Xn connection requests from the target node. The same GgNBId may appear here and in NRCellCU.xnWhiteList. In such case, the GgNBId in xnWhiteList shall be treated as if it is absent. allowedValues: See NOTE 5.	type: String multiplicity: 0..* isOrdered: False isUnique: True defaultValue: None isNullable: False
x2WhiteList	This is a list of GeNBIds. If the target node GeNBId is a member of the source node's NRCellCU.x2WhiteList, the source node is: 1) allowed to request the establishment of an X2 connection to the target node; 2) not allowed to initiate the tear down of an established X2 connection to the target node The same GeNBId may appear here and in NRCellCU.x2BlackList. In such case, the GeNBId here shall be treated as if it is absent. allowedValues: See NOTE 5.	type: String multiplicity: 0..* isOrdered: False isUnique: True defaultValue: None isNullable: False
xnWhiteList	This is a list of GgNBIds. If the target node GgNBId is a member of the source node's NRCellCU.xnWhiteList, the source node is: 1) allowed to request the establishment of Xn connection with the target node; 2) not allowed to initiate the tear down of an established Xn connection to the target node The same GgNBId may appear here and in NRCellCU.xnBlackList. In such case, the GgNBId here shall be treated as if it is absent. allowedValues: See NOTE 5.	type: String multiplicity: 0..* isOrdered: False isUnique: True defaultValue: None isNullable: False

xnHOBlackList	This is a list of GgNBIds. For all the entries in NRCellCU.xnHOBlackList, the subject NRCellCU is prohibited to use the Xn interface for HOs even if an Xn interface exists to the target cell. allowedValues: See NOTE 5.	type: String multiplicity: 0..* isOrdered: False isUnique: True defaultValue: None isNullable: False
x2HOBlackList	This is a list of GeNBIds. For all the entries in NRCellCU.x2HOBlackList, the subject NRCellCU is prohibited to use the X2 interface for HOs even if an X2 interface exists to the target cell. allowedValues: See NOTE 5.	type: String multiplicity: 0..* isOrdered: False isUnique: True defaultValue: None isNullable: False

NOTE 1: Void
NOTE 2: The radio resource can be signaling resources (e.g. RRC connected users) or user plane resources (e.g. PRB, DRB). Different RRM Policy maybe applied for different types of radio resource. E.g. RRMPolicyRatio is used for PRB resource.
NOTE 3: The averaging time interval is implementation dependent.
NOTE 4: A RRM Policy can make use of the defined policy (e.g. RRMPolicyRatio) or a vendor specific RRM Policy.
NOTE 5: For Global gNB Identifiers, the entries are formatted according to the pattern <mcc><mnc>-<gNBIdLength>-<gNBId>, where <mcc> is three digits, <mnc> two or three digits, <gNBIdLength> is a string containing a number n as digits, in the range 22 to 32, and <gNBId> is a string containing digits for the number 0 to 2^n-1. For Global eNB Identifiers, the entries are formatted according to the pattern <mcc><mnc>-<eNBIdLength>-<eNBId>, where <mcc> is three digits, <mnc> two or three digits, <gNBIdLength> is a string containing a number m as digits, m being one of 18, 20, 21 or 22, and <eNBId> is a string containing digits for the number 0 to 2^m-1.
NOTE 6: The maximum number of total RIM RS sequence within 10ms is 32 regardless single or two uplink-downlink period are configured in the 10ms..
NOTE 7:

1. The maximum number of consecutive uplink-downlink switching periods for repetition/near-far-functionality is 8 (the number can be either 2, 4, or 8) with near-far functionality and with repetition.

2. The maximum number of consecutive uplink-downlink switching periods for repetition is 4 (the number can be either 1, 2, or 4) without near-far functionality and with repetition only.

3. The maximum number of consecutive uplink-downlink switching periods is 2 with near-far functionality only and without repetition.

NOTE 8 (for information): “Not enough mitigation” means aggressor gNB needs to increase the interference mitigation level (i.e., further interference mitigation actions) (e.g., further reducing the DL transmission power on DL symbols at aggressor side), while “Enough mitigation” means aggressor gNB keeping the current interference mitigation level unchanged (i.e., no further interference mitigation actions) (e.g., remaining the DL transmission power on DL symbols unchanged at aggressor side).
NOTE 9: Value MS0P5 corresponds to 0.5 ms, MS0P625 corresponds to 0.625 ms, MS1 corresponds to 1 ms, MS1P25 corresponds to 1.25 ms, and so on.

4.5 Common notifications

4.5.1 Alarm notifications

This clause presents a list of notifications, defined in TS 28.532 [35], that an MnS consumer may receive. The notification header attribute objectClass/objectInstance shall capture the DN of an instance of a class defined in the present document.

Name	Qualifier	Notes
notifyNewAlarm	M	--
notifyClearedAlarm	M	--
notifyAckStateChanged	M	--
notifyAlarmListRebuilt	M	--
notifyChangedAlarm	O	--
notifyCorrelatedNotificationChanged	O	--
notifyChangedAlarmGeneral	O	--
notifyComments	O	--
notifyPotentialFaultyAlarmList	O	--

4.5.2 Configuration notifications

This clause presents a list of notifications, defined in TS 28.532 [35], that an MnS consumer may receive. The notification header attribute `objectClass/objectInstance` shall capture the DN of an instance of a class defined in the present document.

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

5 Information Model definitions for 5GC NRM

5.1 Imported information entities and local labels

Label reference	Local label
TS 28.622 [30], IOC, SubNetwork	SubNetwork
TS 28.622 [30], IOC, ManagedElement	ManagedElement
TS 28.622 [30], IOC, ManagedFunction	ManagedFunction
TS 28.622 [30], IOC, EP_RP	EP_RP
TS 28.708 [21], IOC, ServingGWFunction	ServingGWFunction
TS 28.702 [20], IOC, SmsIwmscFunction	SmsIwmscFunction
TS 28.702 [20], IOC, SmsGmscFunction	SmsGmscFunction
TS 28.702 [20], IOC, GmlcFunction	GmlcFunction
TS 28.658 [19], dataType, PLMNId	PLMNId

5.2 Class diagram

5.2.1 Class diagram of 5GC NFs

5.2.1.1 Relationships

This clause depicts the set of classes (e.g. IOCs) that encapsulates the information relevant for NRM of 5GC NFs definitions. This clause provides the overview of the relationships of relevant classes in UML. Subsequent clauses provide more detailed specification of various aspects of these classes.

The Figure 5.2.1.1-1 shows the 5GC NF NRM containment/naming relationship.

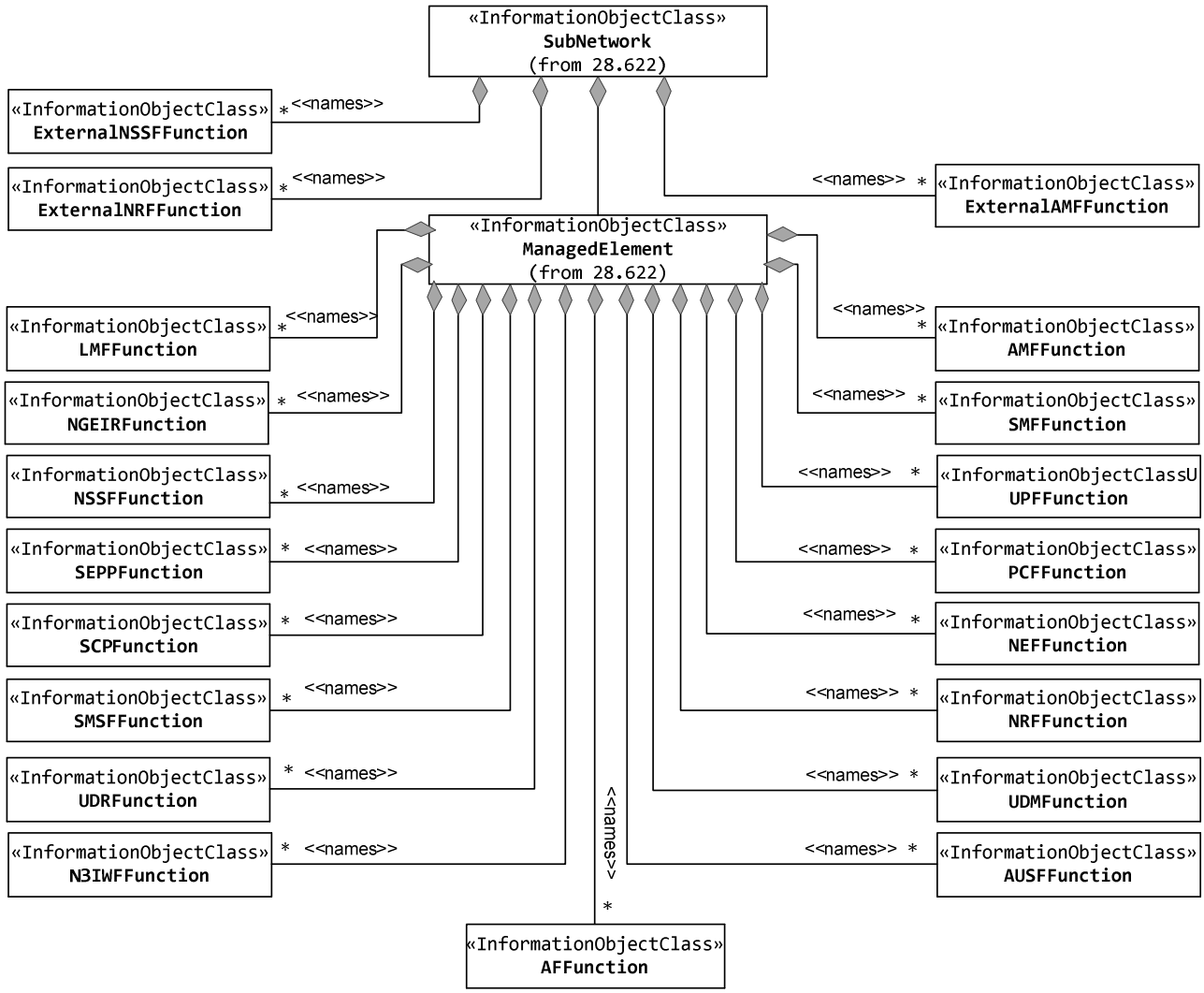

Figure 5.2.1.1-1: 5GC NRM containment/naming relationship

The Figure 5.2.1.1-2 shows the transport view of AMF NRM.

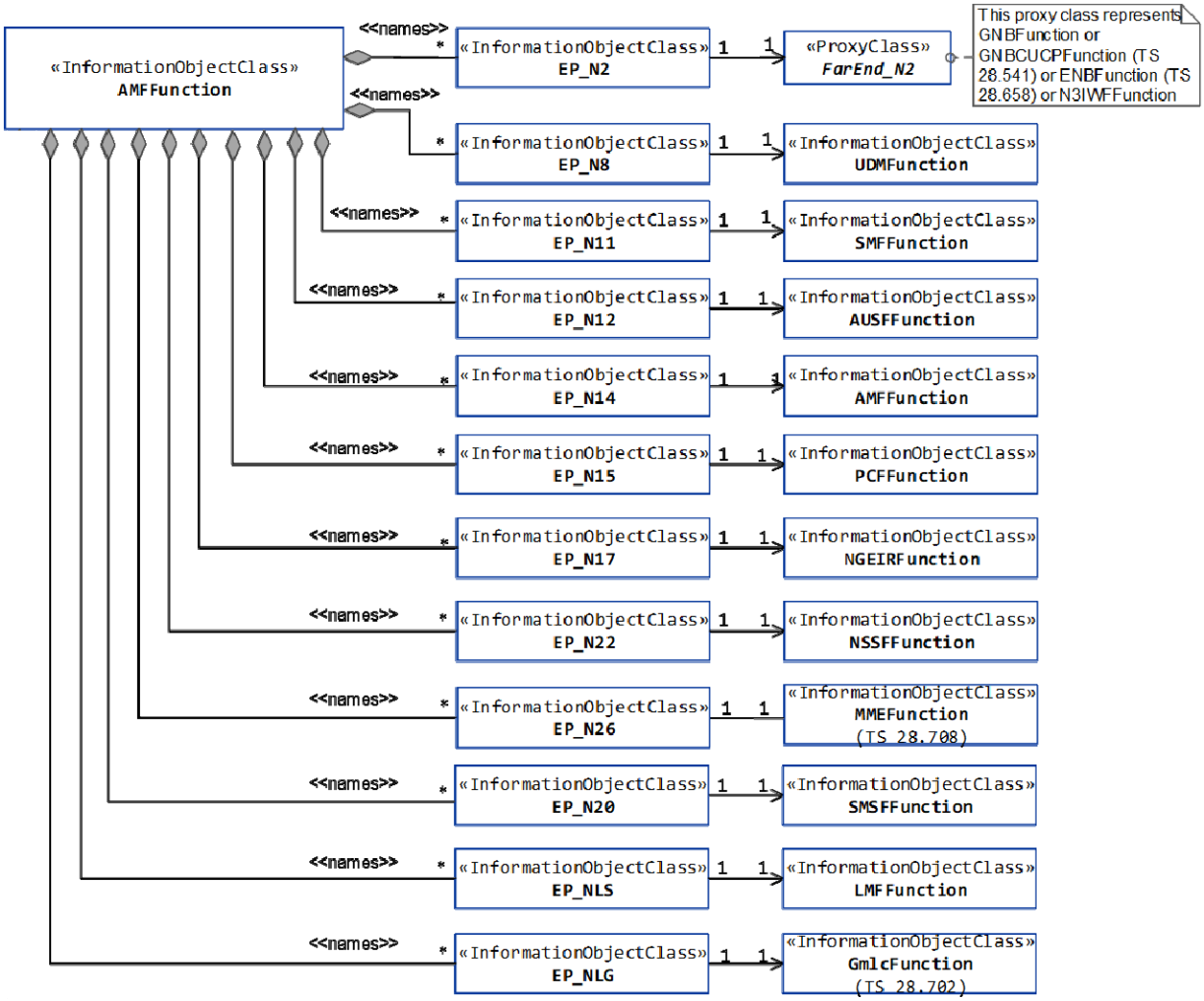

Figure 5.2.1.1-2: Transport view of AMF NRM

The Figure 5.2.1.1-3 shows the transport view of SMF NRM.

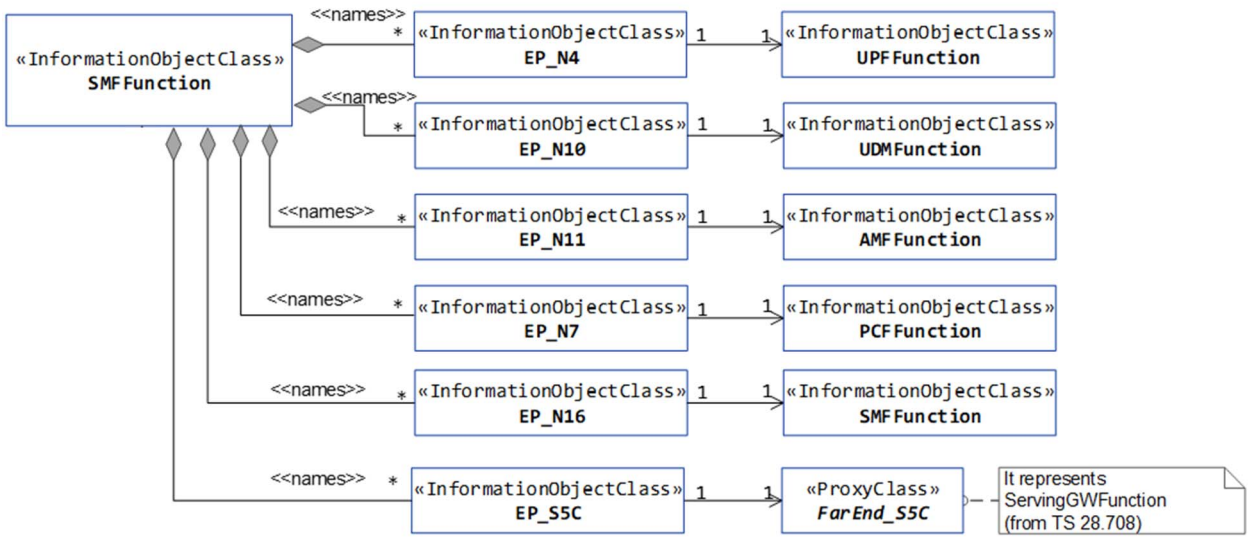

Figure 5.2.1.1-3: Transport view of SMF NRM

The Figure 5.2.1.1-4 shows the transport view of UPF NRM.

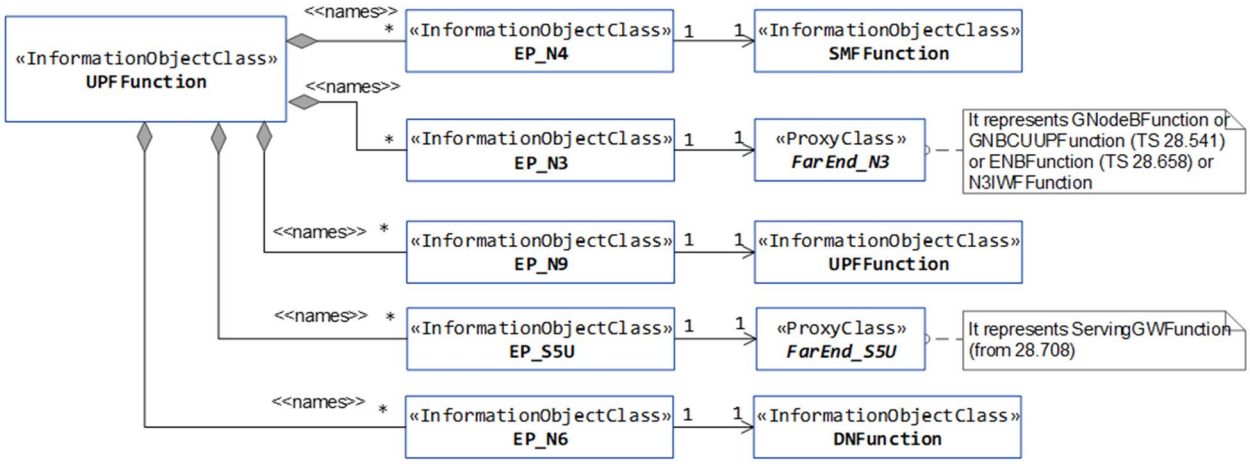

Figure 5.2.1.1-4: Transport view of UPF NRM

The Figure 5.2.1.1-5 shows the transport view of N3IWF NRM.

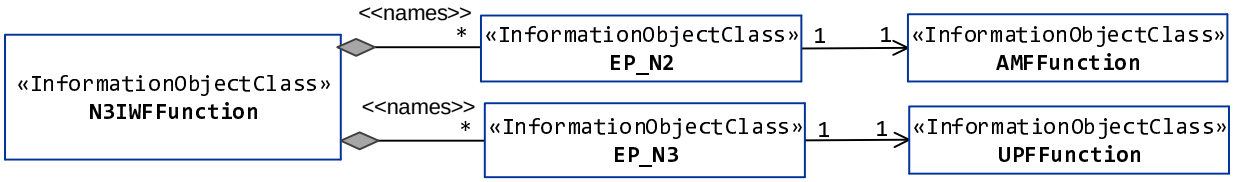

Figure 5.2.1.1-5: Transport view of N3IWF NRM

The Figure 5.2.1.1-6 shows the transport view of PCF NRM.

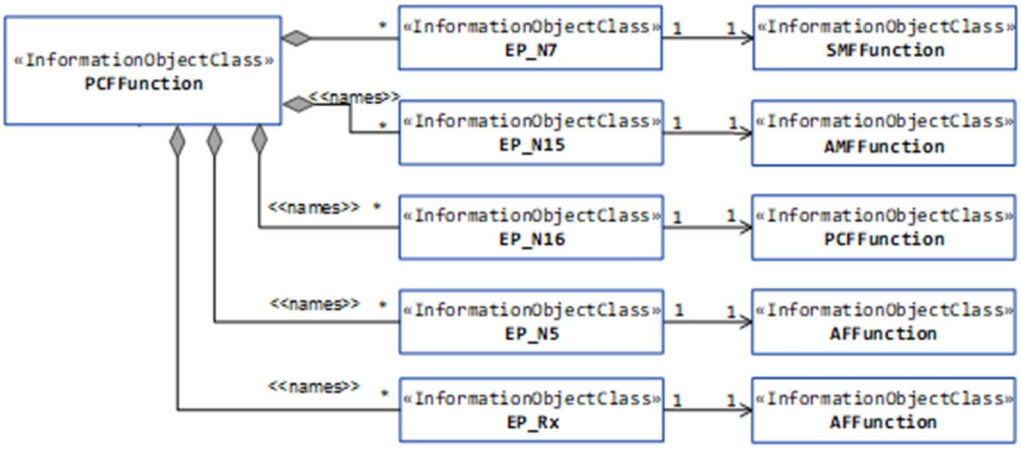

Figure 5.2.1.1-6: Transport view of PCF NRM

The Figure 5.2.1.1-7 shows the transport view of AUSF NRM.

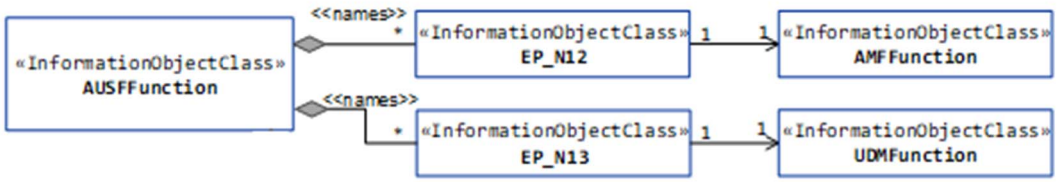

Figure 5.2.1.1-7: Transport view of AUSF NRM

The Figure 5.2.1.1-8 shows the transport view of UDM NRM.

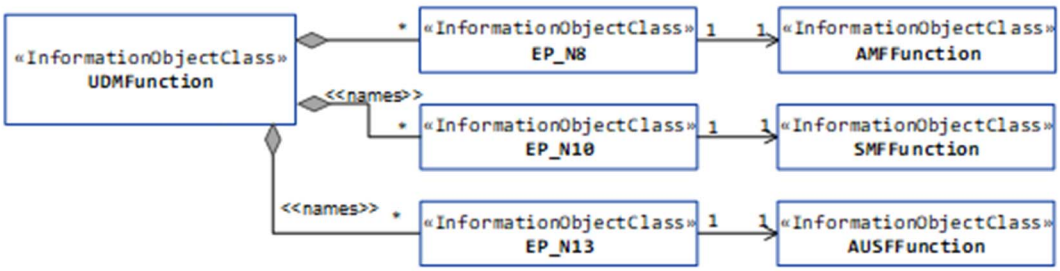

Figure 5.2.1.1-8: Transport view of UDM NRM

The Figure 5.2.1.1-9 shows the transport view of NRF NRM.

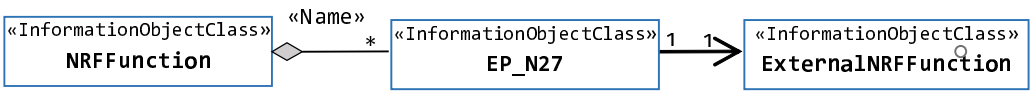

Figure 5.2.1.1-9: Transport view of NRF NRM

The Figure 5.2.1.1-10 shows the transport view of NSSF NRM.

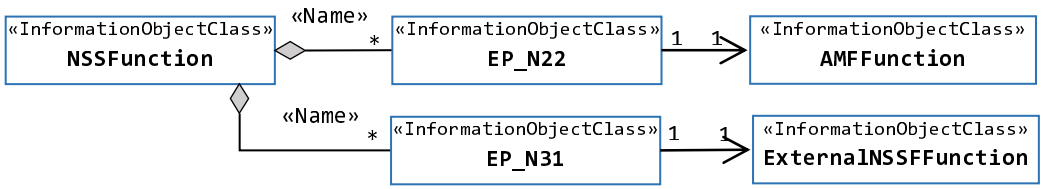

Figure 5.2.1.1-10: Transport view of NSSF NRM

The Figure 5.2.1.1-11 shows the transport view of SMSF NRM.

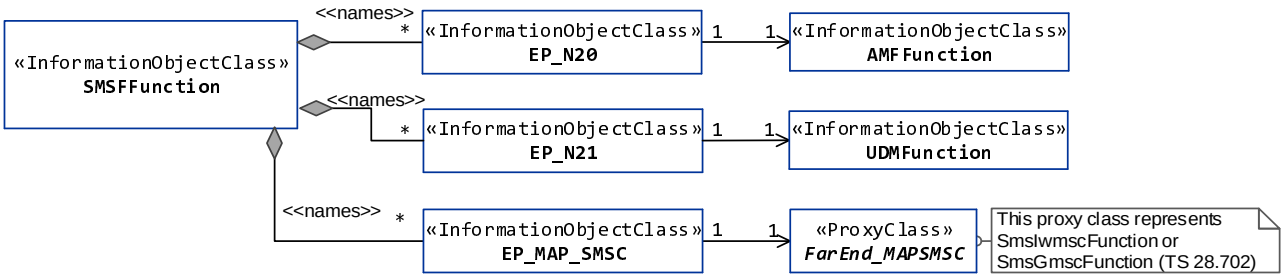

Figure 5.2.1.1-11: Transport view of SMSF NRM

The Figure 5.2.1.1-12 shows the transport view of 5G location service related NRM.

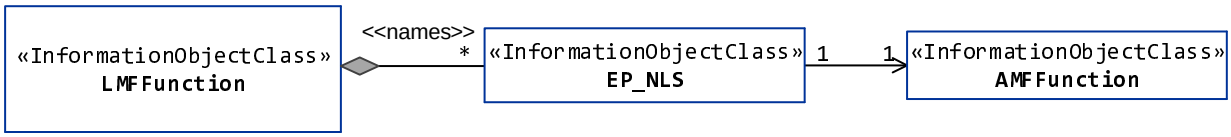

Figure 5.2.1.1-12: Transport view of LMF NRM

The Figure 5.2.1.1-13 shows the transport view of 5G-EIR NRM.

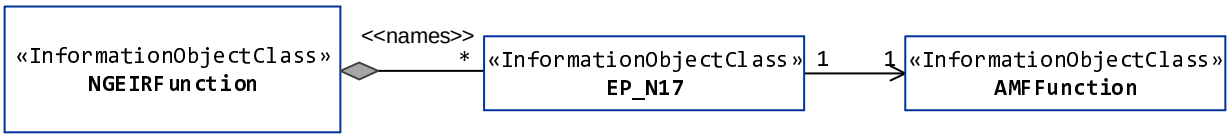

Figure 5.2.1.1-13: Transport view of 5G-EIR NRM

The Figure 5.2.1.1-14 shows the transport view of SEPP NRM.

Figure 5.2.1.1-14: Transport view of SEPP NRM

The Figure 5.2.1.1-15 shows the NRM fragment for control of QoS monitoring per QoS flow per UE.

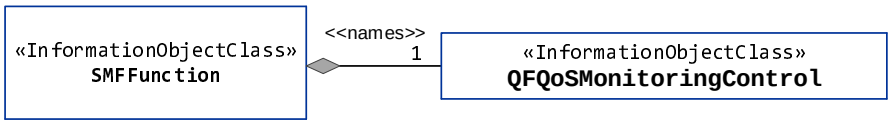

Figure 5.2.1.1-15: NRM fragment for control of QoS monitoring per QoS flow per UE

The Figure 5.2.1.1-16 shows the NRM fragment for control of GTP-U path QoS monitoring.

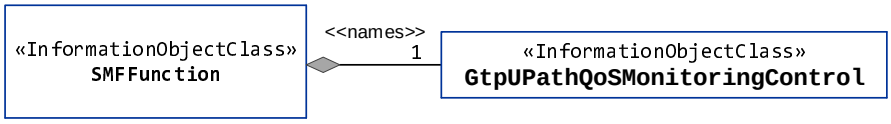

Figure 5.2.1.1-16: NRM fragment for control of GTP-U path QoS monitoring

The Figure 5.2.1.1-17 shows the NRM fragment for configurable 5QIs in 5GC.

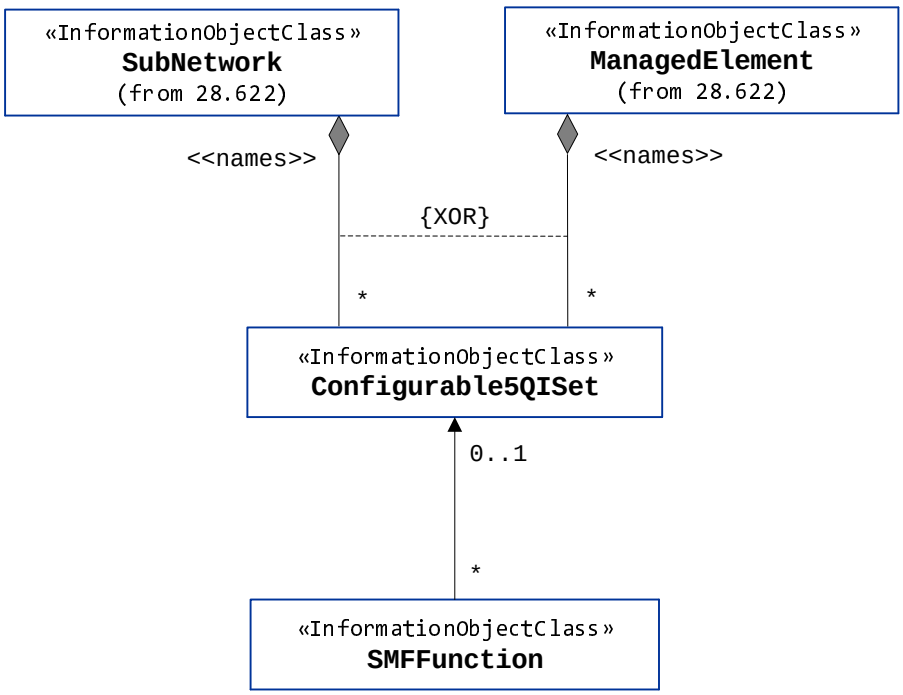

Figure 5.2.1.1-17: NRM fragment for configurable 5QIs in 5GC

The Figure 5.2.1.1-18 shows the NRM fragment for 5QI and DSCP mapping.

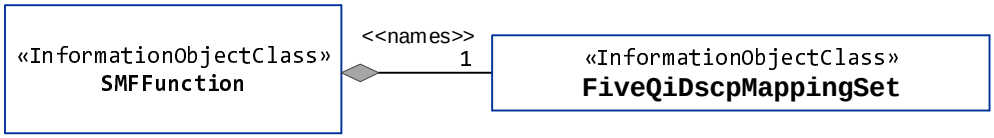

Figure 5.2.1.1-18: NRM fragment for 5QI and DSCP mapping.

5.2.1.2 Inheritance

This clause depicts the inheritance relationships that exist between IOCs.

Figure 5.2.1.2-1 shows the inheritance hierarchy from IOC ManagedFunction related to the 5GC NF NRM.

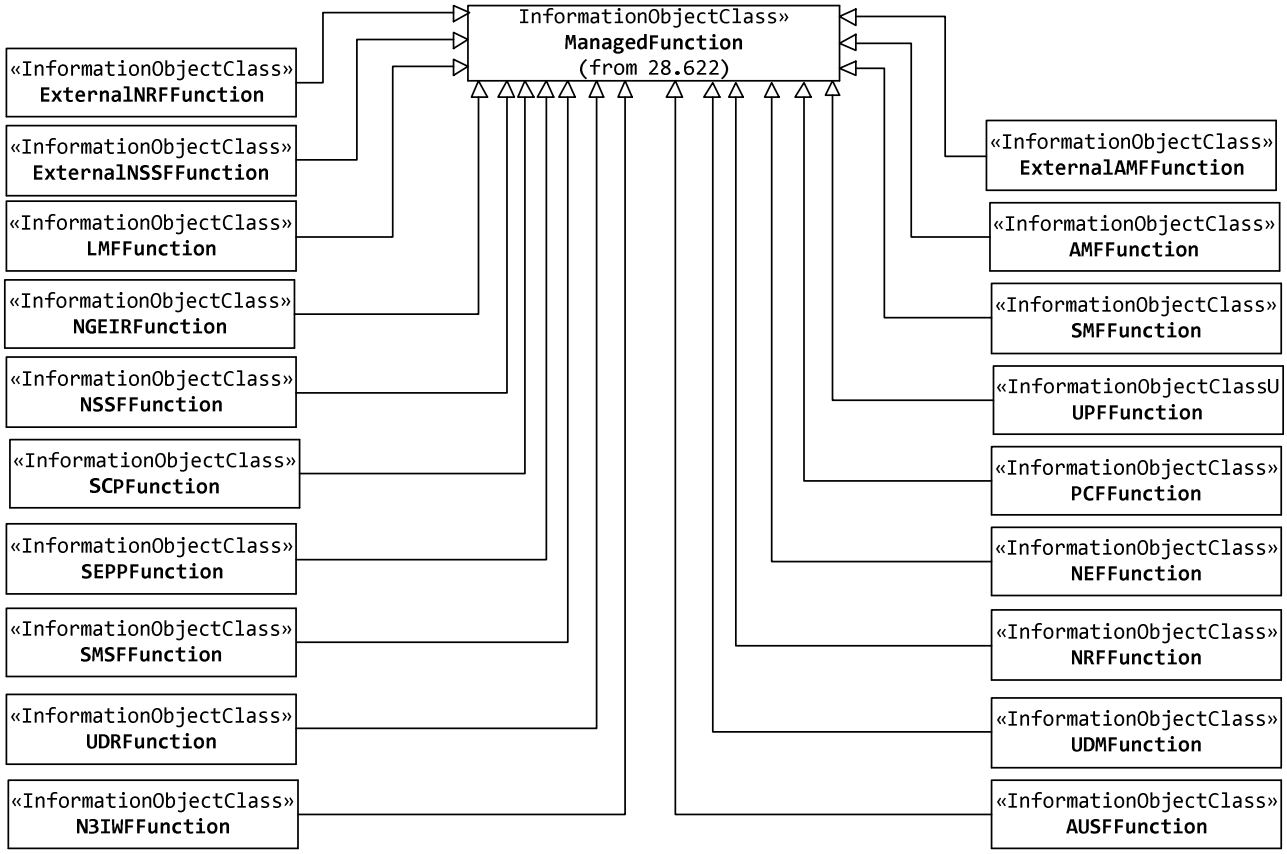

Figure 5.2.1.2-1: Inheritance hierarchy from IOC ManagedFunction related to the 5GC NF NRM

Figure 5.2.1.2-2 shows the inheritance hierarchy from IOC EP_RP related to 5GC NF NRM.

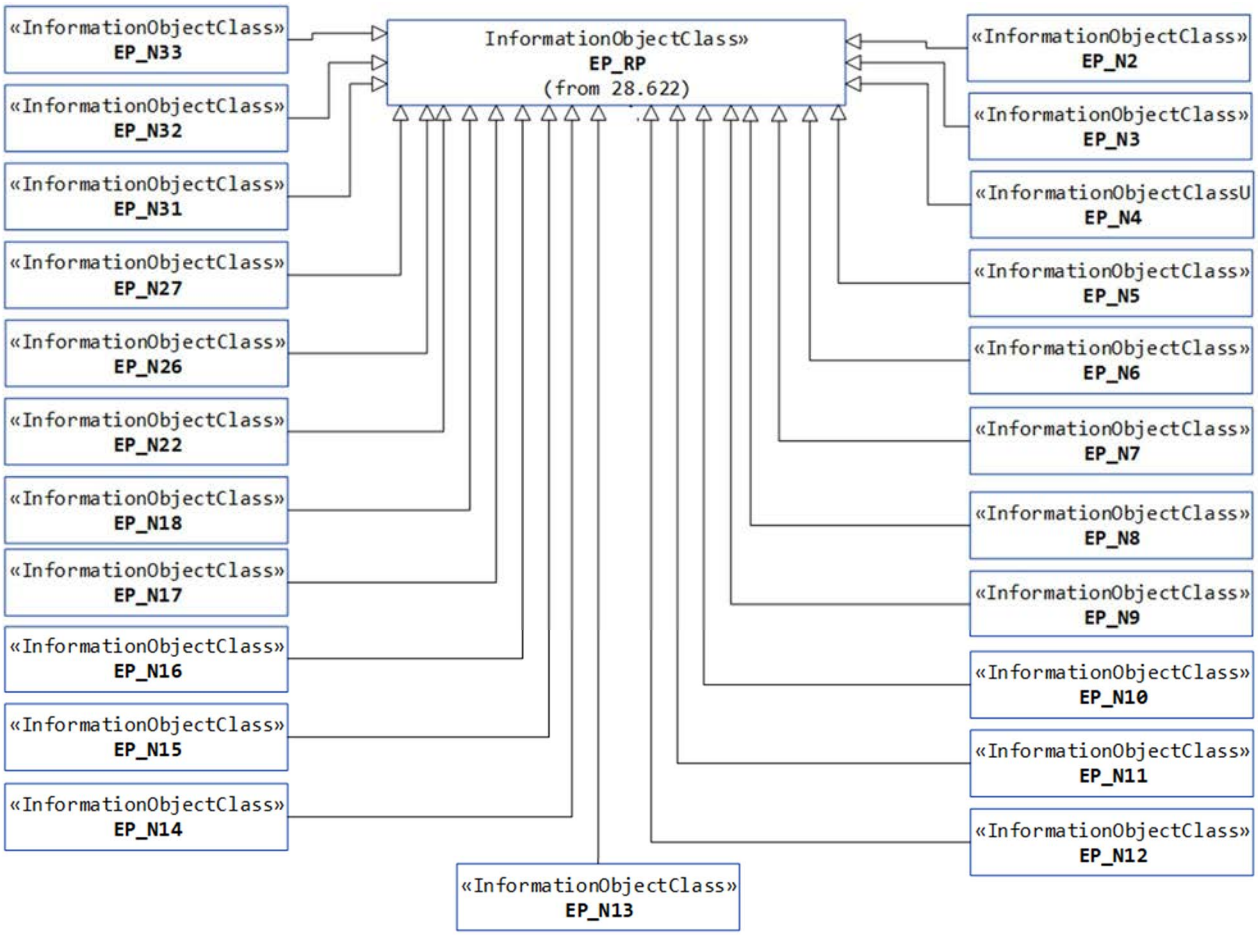

Figure 5.2.1.2-2: Inheritance hierarchy from IOC EP_RP related to the 5GC NF NRM

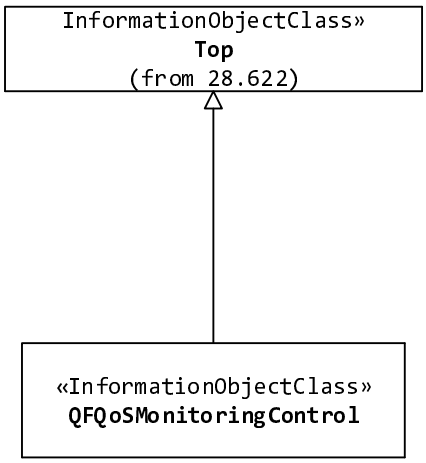

Figure 5.2.1.2-3: Inheritance hierarchy for IOC QFQoSMonitoringControl

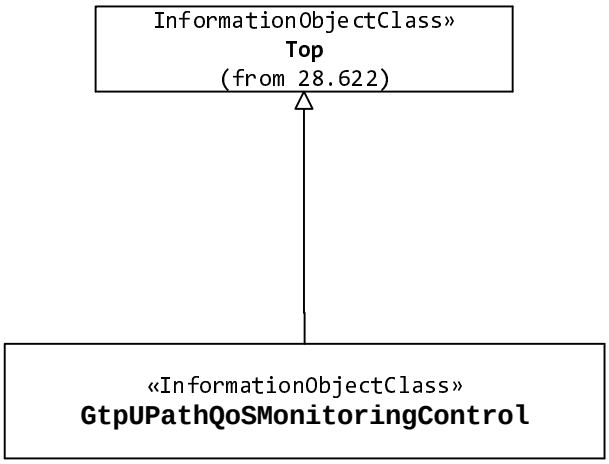

Figure 5.2.1.2-4: Inheritance hierarchy for IOC GtpUPathQoSMonitoringControl

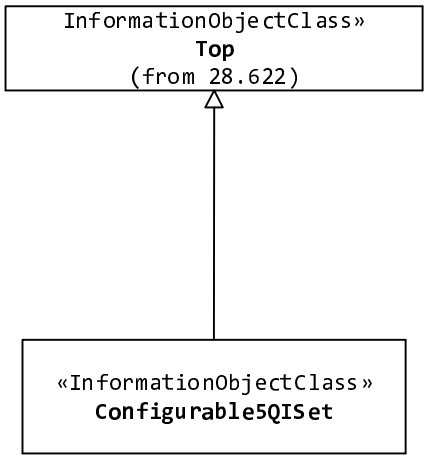

Figure 5.2.1.2-5: Inheritance hierarchy for IOC Configurable5QISet

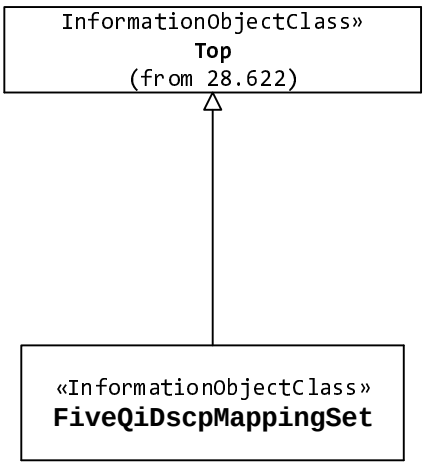

Figure 5.2.1.2-6: Inheritance hierarchy for IOC FiveQiDscpMapping

5.2.2 Class diagram of AMF Region/AMF Set

5.2.2.1 Relationships

This clause depicts the set of classes (e.g. IOCs) that encapsulates the information relevant for NRM of AMF Region/AMF Set definitions. This clause provides the overview of the relationships of relevant classes in UML. Subsequent clauses provide more detailed specification of various aspects of these classes.

The Figure 5.2.2.1-1 shows the AMF Region/AMF Set NRM containment/naming relationship.

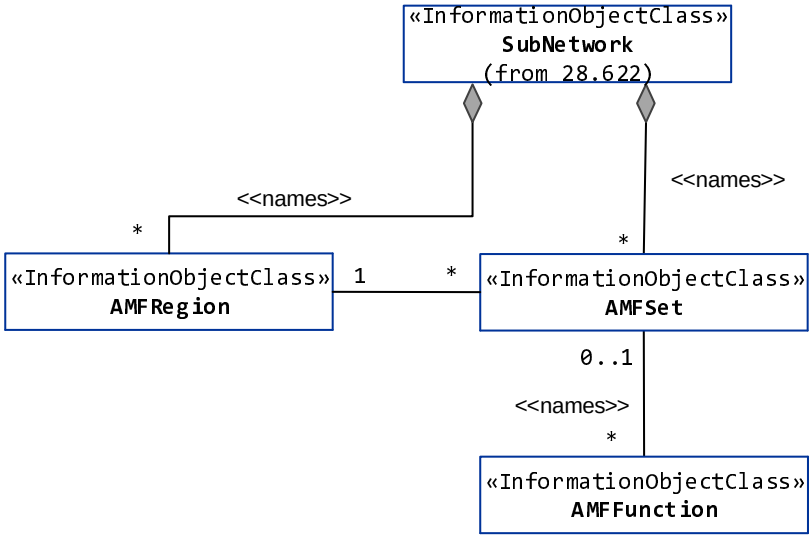

Figure 5.2.2.1-1: AMF Region/AMF Set NRM

5.2.2.2 Inheritance

This clause depicts the inheritance relationships that exist between IOCs.

Figure 5.2.2.2-1 shows the inheritance hierarchy from IOC ManagedFunction related to the AMF Region/AMF Set NRM.

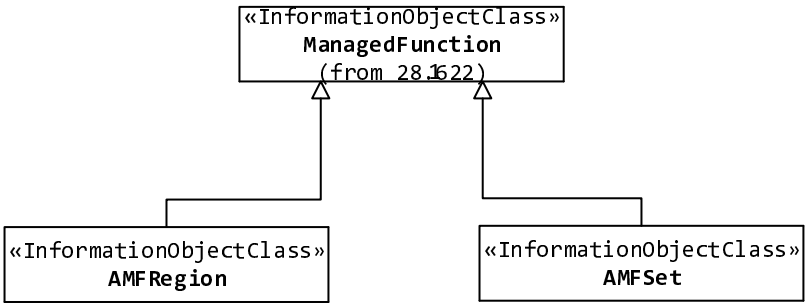

Figure 5.2.2.2-1: AMF Region/AMF Set Inheritance

5.3 Class definitions

5.3.1 AMFFunction

5.3.1.1 Definition

This IOC represents the AMF functionality in 5GC. For more information about the AMF, see 3GPP TS 23.501 [2].

5.3.1.2 Attributes

The AMFFunction 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
pLMNIdList	M	T	T	F	T
aMFIdentifier	M	T	T	F	T
sBIFQDN	M	T	T	F	T
sNSSAIList	CM	T	F	F	T
managedNFProfile	M	T	T	F	T
commModelList	M	T	T	F	T

5.3.1.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: Network slicing feature is supported.

5.3.1.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.2 SMFFunction

5.3.2.1 Definition

This IOC represents the SMF function in 5GC. For more information about the SMF, see 3GPP TS 23.501 [2].

5.3.2.2 Attributes

The SMFFunction 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
pLMNIdList	M	T	T	F	T
nRTAClist	M	T	T	F	T
sBIFQDN	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
managedNFProfile	M	T	T	F	T
commModelList	M	T	T	F	T
Attribute related to role					
configurable5QISetRef	O	T	T	F	T

5.3.2.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: Network slicing feature is supported.

5.3.2.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.3 UPFFunction

5.3.3.1 Definition

This IOC represents the UPF function in 5GC. For more information about the UPF, see 3GPP TS 23.501 [2].

5.3.3.2 Attributes

The UPFFunction 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
pLMNIdList	M	T	T	F	T
nRTAClist	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
managedNFProfile	M	T	T	F	T
supportedBMOList	O	T	T	F	T

5.3.3.3 Attribute constraints

Name	Definition
sNSSAIList CM Support Qualifier	The condition is "network slicing feature is supported".

5.3.3.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.4 N3IWFFunction

5.3.4.1 Definition

This IOC represents the N3IWF function which is used to enable non-3GPP access networks connected to the 5GC. For more information about the N3IWF, see 3GPP TS 23.501 [2].

5.3.4.2 Attributes

The N3IWFFunction 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
pLMNIdList	M	T	T	F	T
commModelList	M	T	T	F	T

5.3.4.3 Attribute constraints

None.

5.3.4.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.5 PCFFunction

5.3.5.1 Definition

This IOC represents the PCF function in 5GC. For more information about the PCF, see 3GPP TS 23.501 [2].

5.3.5.2 Attributes

The PCFFunction 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
pLMNIdList	M	T	T	F	T
sBIFQDN	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
managedNFProfile	M	T	T	F	T
commModelList	M	T	T	F	T
supportedBMOList	O	T	T	F	T

5.3.5.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: network slicing feature is supported.

5.3.5.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.6 AUSFFunction

5.3.6.1 Definition

This IOC represents the AUSF function in 5GC. For more information about the AUSF, see 3GPP TS 23.501 [2].

5.3.6.2 Attributes

The AUSFFunction 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
pLMNIdList	M	T	T	F	T
sBIFQDN	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
managedNFProfile	M	T	T	F	T
commModelList	M	T	T	F	T

5.3.6.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: Network slicing feature is supported.

5.3.6.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.7 UDMFunction

5.3.7.1 Definition

This IOC represents the UDM function in 5GC. For more information about the UDM, see 3GPP TS 23.501 [2].

5.3.7.2 Attributes

The UDMFunction 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
pLMNIdList	M	T	T	F	T
sBIFQDN	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
managedNFProfile	M	T	T	F	T
commModelList	M	T	T	F	T

5.3.5.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: network slicing feature is supported.

5.3.5.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.8 UDRFunction

5.3.8.1 Definition

This IOC represents the UDR function in 5GC. For more information about the UDR, see 3GPP TS 23.501 [2].

5.3.8.2 Attributes

The UDRFunction 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
pLMNIdList	M	T	T	F	T
sBIFQDN	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
managedNFProfile	M	T	T	F	T

5.3.8.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: Network slicing feature is supported.

5.3.8.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.9 UDSFFunction

5.3.9.1 Definition

This IOC represents the UDSF function which can be interacted with any other 5GC NF defined in 3GPP TS 23.501 [2]. For more information about the UDSF, see 3GPP TS 23.501 [2].

5.3.9.2 Attributes

The UDSFFunction 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
pLMNIdList	M	T	T	F	T
sBIFQDN	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
managedNFProfile	M	T	T	F	T

5.3.9.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: Network slicing feature is supported.

5.3.9.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.10 NRFFunction

5.3.10.1 Definition

This IOC represents the NRF function in 5GC. For more information about the NRF, see 3GPP TS 23.501 [2].

5.3.10.2 Attributes

The NRFFunction 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
pLMNIdList	M	T	T	F	T
sBIFQDN	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
nFProfileList	CM	T	T	F	T
cNSIIdList	O	T	T	F	T

5.3.10.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: network slicing feature is supported.
nfProfileList Support Qualifier	Condition: NF profile is registered and deregistered by management system.
nSIIdList Support Qualifier	Condition: Network slicing feature is supported.

5.3.10.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.11 NSSFFunction

5.3.11.1 Definition

This IOC represents the NSSF function in 5GC. For more information about the NSSF, see 3GPP TS 23.501 [2].

5.3.11.2 Attributes

The NSSFFunction 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
pLMNIdList	M	T	T	F	T
sBIFQDN	M	T	T	F	T
sNSSAIList	M	T	T	F	T
cNSIIdList	O	T	T	F	T
managedNFProfile	M	T	T	F	T
commModelList	M	T	T	F	T

5.3.11.3 Attribute constraints

None.

5.3.11.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.12 AFFunction

5.3.12.1 Definition

This IOC is defined for only purpose to describe the IOCs representing its interaction interface with 5GC (i.e. EP_Rx and EP_N5). It has no any attributes defined.

5.3.13 DNFunction

5.3.13.1 Definition

This IOC is defined for only purpose to describe the IOCs representing Data Network (DN) interaction interface with 5GC (i.e. EP_N6). It has no any attributes defined.

5.3.14 SMSFFunction

5.3.14.1 Definition

This IOC represents the SMSF function defined in 3GPP TS 23.501 [2].

5.3.14.2 Attributes

The SMSFFunction 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
pLMNIdList	M	T	T	F	T
managedNFProfile	M	T	T	F	T
commModelList	M	T	T	F	T

5.3.14.3 Attribute constraints

None.

5.3.14.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.15 LMFFunction

5.3.15.1 Definition

This IOC represents the LMF function defined in 3GPP TS 23.501 [2].

5.3.15.2 Attributes

The LMFFunction 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
pLMNIdList	M	T	T	F	T
managedNFProfile	M	T	T	F	T
commModelList	M	T	T	F	T

5.3.15.3 Attribute constraints

None.

5.3.15.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.16 NGEIRFunction

5.3.16.1 Definition

This IOC represents the 5G-EIR function in 5GC. For more information about the 5G-EIR, see 3GPP TS 23.501 [2].

5.3.16.2 Attributes

The NGEIRFunction 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
pLMNIdList	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
managedNFProfile	M	T	T	F	T
commModelList	M	T	T	F	T

5.3.16.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: network slicing feature is supported.

5.3.16.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.17 SEPPFunction

5.3.17.1 Definition

This IOC represents the SEPP function which support message filtering and policing on inter-PLMN control plane interface. For more information about the SEPP, see 3GPP TS 23.501 [2].

5.3.17.2 Attributes

The SEPPFunction 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
pLMNId	M	T	F	T	T
sEPPType	M	T	F	T	T
sEPPId	M	T	F	T	T
fqdn	M	T	T	F	T

5.3.17.3 Attribute constraints

None.

5.3.17.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.18 NWDAFFunction

5.3.18.1 Definition

This IOC represents the NWDAF function in 5GC. For more information about the NWDAF, see 3GPP TS 23.501 [2].

5.3.18.2 Attributes

The NWDAFFunction 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
pLMNIdList	M	T	T	F	T
sBIFQDN	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
managedNFProfile	M	T	T	F	T
commModelList	M	T	T	F	T

5.3.18.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: Network slicing feature is supported.

5.3.18.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.19 EP_N2

5.3.19.1 Definition

This IOC represents the N2 interface between (R)AN and AMF, which is defined in 3GPP TS 23.501 [2].

5.3.19.2 Attributes

The EP_N2 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.19.3 Attribute constraints

None.

5.3.19.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.20 EP_N3

5.3.20.1 Definition

This IOC represents the N3 interface between (R)AN and UPF, which is defined in 3GPP TS 23.501 [2].

5.3.20.2 Attributes

The EP_N3 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.20.3 Attribute constraints

None.

5.3.20.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.21 EP_N4

5.3.21.1 Definition

This IOC represents the N4 interface between SMF and UPF, which is defined in 3GPP TS 23.501 [2].

5.3.21.2 Attributes

The EP_N4 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.21.3 Attribute constraints

None.

5.3.21.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.22 EP_N5

5.3.22.1 Definition

This IOC represents the N5 interface between PCF and AF, which is defined in 3GPP TS 23.501 [2].

5.3.22.2 Attributes

The EP_N5 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.22.3 Attribute constraints

None.

5.3.22.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.23 EP_N6

5.3.23.1 Definition

This IOC represents the N6 interface between UPF and DN, which is defined in 3GPP TS 23.501 [2].

5.3.23.2 Attributes

The EP_N6 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.23.3 Attribute constraints

None.

5.3.23.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.24 EP_N7

5.3.24.1 Definition

This IOC represents the N7 interface between SMF and PCF, which is defined in 3GPP TS 23.501 [2].

5.3.24.2 Attributes

The EP_N7 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.24.3 Attribute constraints

None.

5.3.24.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.25 EP_N8

5.3.25.1 Definition

This IOC represents the N8 interface between AMF and UDM, which is defined in 3GPP TS 23.501 [2].

5.3.25.2 Attributes

The EP_N8 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.25.3 Attribute constraints

None.

5.3.25.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.26 EP_N9

5.3.26.1 Definition

This IOC represents the N7 interface between two UPFs, which is defined in 3GPP TS 23.501 [2].

5.3.26.2 Attributes

The EP_N9 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.26.3 Attribute constraints

None.

5.3.26.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.27 EP_N10

5.3.27.1 Definition

This IOC represents the N10 interface between SMF and UDM, which is defined in 3GPP TS 23.501 [2].

5.3.27.2 Attributes

The EP_N10 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.27.3 Attribute constraints

None.

5.3.27.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.28 EP_N11

5.3.28.1 Definition

This IOC represents the N11 interface between AMF and SMF, which is defined in 3GPP TS 23.501 [2].

5.3.28.2 Attributes

The EP_N11 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.28.3 Attribute constraints

None.

5.3.28.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.29 EP_N12

5.3.29.1 Definition

This IOC represents the N12 interface between AMF and AUSF, which is defined in 3GPP TS 23.501 [2].

5.3.29.2 Attributes

The EP_N12 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.29.3 Attribute constraints

None.

5.3.29.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.30 EP_N13

5.3.30.1 Definition

This IOC represents the N13 interface between AUSF and UDM, which is defined in 3GPP TS 23.501 [2].

5.3.30.2 Attributes

The EP_N13 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.30.3 Attribute constraints

None.

5.3.30.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.31 EP_N14

5.3.31.1 Definition

This IOC represents the N14 interface between two AMFs, which is defined in 3GPP TS 23.501 [2].

5.3.31.2 Attributes

The EP_N14 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.31.3 Attribute constraints

None.

5.3.31.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.32 EP_N15

5.3.32.1 Definition

This IOC represents the N15 interface between AMF and PCF, which is defined in 3GPP TS 23.501 [2].

5.3.32.2 Attributes

The EP_N15 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.32.3 Attribute constraints

None.

5.3.32.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.33 EP_N16

5.3.33.1 Definition

This IOC represents the N16 interface between two SMFs, which is defined in 3GPP TS 23.501 [2].

5.3.33.2 Attributes

The EP_N16 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.33.3 Attribute constraints

None.

5.3.33.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.34 EP_N17

5.3.34.1 Definition

This IOC represents the N17 interface between AMF and 5G-EIR, which is defined in 3GPP TS 23.501 [2].

5.3.34.2 Attributes

The EP_N17 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.34.3 Attribute constraints

None.

5.3.34.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.35 EP_N20

5.3.35.1 Definition

This IOC represents the N20 interface between AMF and SMSF, which is defined in 3GPP TS 23.501 [2].

5.3.35.2 Attributes

The EP_N20 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.35.3 Attribute constraints

None.

5.3.35.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.36 EP_N21

5.3.36.1 Definition

This IOC represents the N21 interface between SMSF and UDM, which is defined in 3GPP TS 23.501 [2].

5.3.36.2 Attributes

The EP_N21 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.36.3 Attribute constraints

None.

5.3.36.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.37 EP_N22

5.3.37.1 Definition

This IOC represents the N22 interface between AMF and NSSF, which is defined in 3GPP TS 23.501 [2].

5.3.37.2 Attributes

The EP_N22 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.37.3 Attribute constraints

None.

5.3.37.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.38 EP_N26

5.3.38.1 Definition

This IOC represents the N26 interface between AMF and MME, which is defined in 3GPP TS 23.501 [2].

5.3.38.2 Attributes

The EP_N26 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.38.3 Attribute constraints

None.

5.3.38.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.39 Void

5.3.40 Void

5.3.41 EP_S5C

5.3.41.1 Definition

This IOC represents the S5-C interface between SGW and SMF/PGW-C, which is defined in 3GPP TS 23.501 [2].

5.3.41.2 Attributes

The EP_S5C IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.41.3 Attribute constraints

None.

5.3.41.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.42 EP_S5U

5.3.42.1 Definition

This IOC represents the S5-U interface between SGW and UPF/PGW-U, which is defined in 3GPP TS 23.501 [2].

5.3.42.2 Attributes

The EP_S5U IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.42.3 Attribute constraints

None.

5.3.42.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.43 EP_Rx

5.3.43.1 Definition

This IOC represents the Rx interface between PCF and AF, which is defined in 3GPP TS 23.501 [2].

5.3.43.2 Attributes

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

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.43.3 Attribute constraints

None.

5.3.43.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.44 EP_MAP_SMSC

5.3.44.1 Definition

This IOC represents the MAP interface between SMSF and MSC-IWMSC/GMSC, which is defined in 3GPP TS 23.040 [22].

5.3.44.2 Attributes

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

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.44.3 Attribute constraints

None.

5.3.44.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.45 EP_NLS

5.3.45.1 Definition

This IOC represents the NLs interface between AMF and LMF, which is defined in 3GPP TS 23.501 [2].

5.3.45.2 Attributes

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

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.45.3 Attribute constraints

None.

5.3.45.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.46 EP_NLG

5.3.46.1 Definition

This IOC represents the NLg interface between AMF and GMLC, which is defined in 3GPP TS 23.501 [2].

5.3.46.2 Attributes

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

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.46.3 Attribute constraints

None.

5.3.46.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.47 EP_N27

5.3.47.1 Definition

This IOC represents an end point of N27 interface between vNRF and hNRF, which is defined in 3GPP TS 29.510 [10].

5.3.47.2 Attributes

The EP_N27 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.47.3 Attribute constraints

None.

5.3.47.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.48 EP_N31

5.3.48.1 Definition

This IOC represents an end point of N31 interface between vNSSF and hNSSF, which is defined in 3GPP TS 29.531 [11].

5.3.48.2 Attributes

The EP_N31 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.48.3 Attribute constraints

None.

5.3.48.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.49 ExternalNRFFunction

5.3.49.1 Definition

This IOC represents external NRF function controlled by another management domain. For more information about the NRF, see 3GPP TS 23.501 [2].

5.3.49.2 Attributes

The ExternalNRFFunction 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
id	M	T	F	F	T
pLMNIdList	M	T	T	F	T

5.3.49.3 Attribute constraints

None.

5.3.49.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.50 ExternalNSSFFunction

5.3.50.1 Definition

This IOC represents external NSSF function controlled by another management domain. For more information about the NSSF, see 3GPP TS 23.501 [2].

5.3.50.2 Attributes

The ExternalNSSFFunction 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
id	M	T	F	F	T
pLMNIdList	M	T	T	F	T

5.3.50.3 Attribute constraints

None.

5.3.50.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.51 AMFSet

5.3.51.1 Definition

This IOC represents the AMF Set which consists of some AMFs that serve a given area and Network Slice. For more information about the AMF Set, see 3GPP TS 23.501 [2].

5.3.51.2 Attributes

The AMFSet 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
pLMNIdList	M	T	T	F	T
nRTAClist	M	T	T	F	T
aMFSetId	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
Attribute related to role					
aMFRegion	M	T	T	F	T
aMFSetMemberList	M	T	T	F	T

5.3.51.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: Network slicing feature is supported.

5.3.51.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.52 AMFRegion

5.3.52.1 Definition

This IOC represents the AMF Region which consists one or multiple AMF Sets. For more information about the AMF Region, see 3GPP TS 23.501 [2].

5.3.52.2 Attributes

The AMFRegion 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
pLMNIdList	M	T	T	F	T
nRTAClist	M	T	T	F	T
aMFRegionId	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
Attribute related to role					
aMFSet	M	T	T	F	T

5.3.52.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: Network slicing feature is supported.

5.3.52.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.53 ExternalAMFFunction

5.3.53.1 Definition

This IOC represents an external AMF functionality used in EN-DC. For more information about the AMF, see 3GPP TS 23.501 [2].

5.3.53.2 Attributes

The ExternalAMFFunction 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
Id	M	T	F	F	T
pLMNIdList	M	T	T	F	T
aMFIdentifier	M	T	T	F	T

5.3.53.3 Attribute constraints

None.

5.3.53.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.54 ManagedNFProfile <<dataType>>

5.3.54.1 Definition

This data type represents a Profile definition of a Managed NF (See TS 23.501 [22]).

5.3.54.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
nfInstanceID	M	T	F	T	F
nfType	M	T	F	F	F
hostAddr	M	T	T	F	T
authzInfo	O	T	T	F	T
location	O	T	T	F	T
capacity	O	T	T	F	T
nFInfo	M	T	T	F	T

5.3.54.3 Attribute constraints

None.

5.3.54.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.3.55 HostAddr <<choice>>

5.3.55.1 Definition

This <<choice>> stereotype represents one of a set of data types as shown in Figure 5.3.55.1-1: HostAddr <<choice>> for data types.

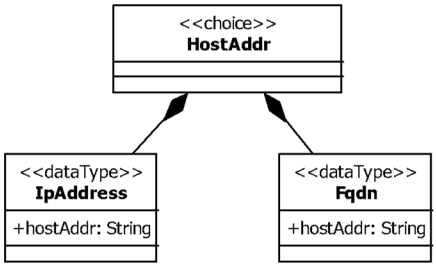

Figure 5.3.55.1-1: HostAddr <<choice>> for data types

NOTE: The IpAddress can be IPv4 address (See RFC 791 [24]) or IPv6 address (See RFC 2373 [25]). Refer TS 23.003 [5] for Fqdn.

5.3.56 NFInfo <<choice>>

5.3.56.1 Definition

This <<choice>> stereotype represents one of a set of data types as shown in Figure 5.3.56.1-1: NFInfo <<choice>> for data types.

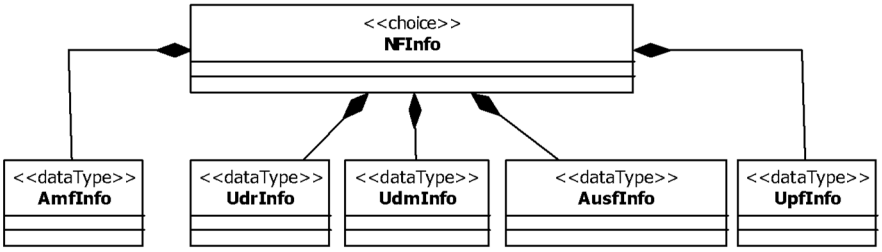

Figure 5.3.56.1-1: NFInfo choice for data types

NOTE: The AmfInfo <<dataType>> is chosed for AFMFunction, the UdrInfo <<dataType>> is chosed for UDRFunction, the UdmInfo <<dataType>> is chosed for UDMFunction, the AusfInfo<<dataType>> is chosed for AUSFFunction, the UpfInfo <<dataType>> is chosed for UPFFunction

5.3.57 UdmInfo <<dataType>>

5.3.57.1 Definition

This data type represents a generic NFProfile definition (See TS 23.501 [22]).

5.3.57.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
nFSrvGroupId	M	T	F	F	F

5.3.57.3 Attribute constraints

None

5.3.57.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.3.58 AusfInfo <<dataType>>

5.3.58.1 Definition

This data type represents a generic NFProfile definition (See TS 23.501 [22]).

5.3.58.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
nFSrvGroupId	M	T	F	T	F

5.3.58.3 Attribute constraints

None.

5.3.58.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.3.59 UpfInfo <<dataType>>

5.3.59.1 Definition

This data type represents a generic NFProfile definition (See TS 23.501 [22]).

5.3.59.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
smfServingAreas	O	T	T	F	T

5.3.59.3 Attribute constraints

None.

5.3.59.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.3.60 AmfInfo <<dataType>>

5.3.60.1 Definition

This data type represents AMF specific data in NFProfile definition (See TS 23.501 [22]).

5.3.60.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
priority	O	T	T	F	T

5.3.60.3 Attribute constraints

None.

5.3.60.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.3.61 Udrinfo <<dataType>>

5.3.61.1 Definition

This data type represents UDR specific data in NFProfile definition (See TS 23.501 [22]).

5.3.61.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
supportedDataSetIds	O	T	T	F	T
nFSrvGroupId	O	T	T	F	T

5.3.61.3 Attribute constraints

None.

5.3.61.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.3.62 EP_N32

5.3.62.1 Definition

This IOC represents an end point of N32 interface between cSEPP and pSEPP, which is defined in 3GPP TS 23.501 [2] and 33.501 [52].

5.3.62.2 Attributes

The EP_N32 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
remotePlmnId	M	T	T	F	T
remoteSeppAddress	M	T	T	F	T
remoteSeppId	O	T	T	F	T
n32cParas	O	T	T	F	T
n32fPolicy	O	T	T	F	T
withIPX	M	T	T	F	T

5.3.62.3 Attribute constraints

None.

5.3.62.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.63 ExternalSEPPFunction

5.3.63.1 Definition

This IOC represents the properties, known by the management function, of a SEPP managed by another management function. For more information about SEPPFunction, see subclause 5.3.17.

5.3.63.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
pLMNId	M	T	F	F	T
sEPPId	M	T	F	T	T
fqdn	M	T	F	F	T

5.3.63.3 Attribute constraints

None.

5.3.63.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.64 SEPPFunction <<ProxyClass>>

5.3.64.1 Definition

This IOC represents an <<IOC>>SEPPFunction and <<IOC>>ExternalSEPPFunction.

5.3.64.2 Attributes

See that defined in <<IOC>>SEPPFunction and <<IOC>>ExternalSEPPFunction.

5.3.64.3 Attribute constraints

See respective IOCs.

5.3.64.4 Notifications

See respective IOCs.

5.3.65 NEFFunction

5.3.65.1 Definition

This IOC represents the NEF function in 5GC. For more information about the NEF, see 3GPP TS 23.501 [2].

5.3.65.2 Attributes

The NEFFunction 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
sBIFQDN	M	T	T	F	T
sNSSAIList	CM	T	T	F	T
managedNFProfile	M	T	T	F	T
capabilityList	M	T	T	F	T
isINEF	O	T	F	T	F
isCAPIFSup	M	T	F	T	F

5.3.65.3 Attribute constraints

Name	Definition
sNSSAIList Support Qualifier	Condition: Network slicing feature is supported.

5.3.65.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.66 SCPFunction

5.3.67.1 Definition

This IOC represents a Service Communication Proxy, which is defined in 3GPP TS 23.501 [2].

5.3.67.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
supportedFuncList	M	T	T	F	T
address	M	T	T	F	T

5.3.67.3 Attribute constraints

None.

5.3.67.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.68 SupportedFunction <<dataType>>

5.3.68.1 Definition

This dataType represents a functionality supported by a SCP, which is defined in 3GPP TS 23.501 [2].

5.3.68.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
function	M	T	T	F	T
policy	O	T	T	F	T

5.3.68.3 Attribute constraints

None.

5.3.68.4 Notifications

The subclause 5.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.3.69 CommModel <<dataType>>

5.3.69.1 Definition

This data type represents a communication model definition (See TS 23.501 [22]).

5.3.69.2 Attributes

Attribute Name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
groupId	M	T	T	F	T
commModelType	M	T	T	F	T
targetNFServiceList	M	T	T	F	T
commModelConfiguration	M	T	T	F	T

5.3.69.3 Attribute constraints

None

5.3.69.4 Notifications

The subclause 5.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.3.70 QFQoSMonitoringControl

5.3.70.1 Definition

This IOC specifies the capabilities and properties for control of QoS monitoring per QoS flow per UE for URLLC service. For more information about QoS monitoring per QoS flow per UE, see 3GPP TS 23.501 [2].

If the QoS monitoring per QoS flow per UE is enabled, the SMF requests the PSA UPF to perform the QoS monitoring per QoS flow per UE based on the attributes of the instance of this IOC.

5.3.70.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
qFQoSMonitoringState	M	T	T	F	T
qFMonitoredSNSSAIs	M	T	T	F	T
qFMonitored5QIs	M	T	T	F	T
isEventTriggeredQFMonitoringSupported	M	T	F	F	T
isPeriodicQFMonitoringSupported	M	T	F	F	T
isSessionReleasedQFMonitoringSupported	M	T	F	F	T
qFPacketDelayThresholds	CM	T	T	F	T
qFMinimumWaitTime	CM	T	T	F	T
qFMeasurementPeriod	CM	T	T	F	T

5.3.70.3 Attribute constraints

Name	Definition
qFPacketDelayThresholds Support Qualifier	Condition: isEventTriggeredQFMonitoringSupported attribute of the same MOI is set to "Yes".
qFMinimumWaitTime Support Qualifier	Condition: isEventTriggeredQFMonitoringSupported attribute of the same MOI is set to "Yes".
qFMeasurementPeriod Support Qualifier	Condition: isPeriodicQFMonitoringSupported attribute of the same MOI is set to "Yes".

5.3.70.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.71 QFDelayThresholdsType <<dataType>>

5.3.71.1 Definition

This data type specifies the thresholds for reporting the packet delay for QoS monitoring per QoS flow per UE, see TS 29.244 [56].

5.3.71.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
thresholdDl	M	T	T	F	T
thresholdUl	M	T	T	F	T
thresholdRtt	M	T	T	F	T

5.3.71.3 Attribute constraints

None

5.3.71.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.3.72 GtpUPathQoSMonitoringControl

5.3.72.1 Definition

This IOC specifies the capabilities and properties for control of GTP-U path QoS monitoring. For more information about the GTP-U path QoS monitoring, see 3GPP TS 23.501 [2].

If the GTP-U path QoS monitoring is enabled, the SMF requests the UPF(s) and NG-RAN to perform the GTP-U path QoS monitoring based on the attributes of the instance of this IOC.

5.3.72.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
gtpUPathQoSMonitoringState	M	T	T	F	T
gtpUPathMonitoredSNSSAIs	M	T	T	F	T
monitoredDSCPs	M	T	T	F	T
isEventTriggeredGtpUPathMonitoringSupported	M	T	F	F	T
isPeriodicGtpUMonitoringSupported	M	T	F	F	T
isImmediateGtpUMonitoringSupported	M	T	F	F	T
gtpUPathDelayThresholds	CM	T	T	F	T
gtpUPathMinimumWaitTime	CM	T	T	F	T
gtpUPathMeasurementPeriod	CM	T	T	F	T

5.3.72.3 Attribute constraints

Name	Definition
gtpUPathDelayThresholds Support Qualifier	Condition: isEventTriggeredGtpUPathMonitoringSupported attribute of the same MOI is set to "Yes".
gtpUPathMinimumWaitTime Support Qualifier	Condition: isEventTriggeredGtpUPathMonitoringSupported attribute of the same MOI is set to "Yes".
gtpUPathMeasurementPeriod Support Qualifier	Condition: isPeriodicGtpUMonitoringSupported attribute of the same MOI is set to "Yes".

5.3.72.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.73 GtpUPathDelayThresholdsType <<dataType>>

5.3.73.1 Definition

This data type specifies the thresholds for reporting the packet delay for GTP-U path QoS monitoring, see TS 29.244 [56].

5.3.73.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
n3AveragePacketDelayThreshold	M	T	T	F	T
n3MinPacketDelayThreshold	M	T	T	F	T
n3MaxPacketDelayThreshold	M	T	T	F	T
n9AveragePacketDelayThreshold	M	T	T	F	T
n9MinPacketDelayThreshold	M	T	T	F	T
n9MaxPacketDelayThreshold	M	T	T	F	T

5.3.73.3 Attribute constraints

None

5.3.73.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.3.75 Configurable5QISet

5.3.75.1 Definition

This IOC specifies the non-standardized 5QIs, including their QoS characteristics, that need to be pre-configured (and configurable) to the 5G NFs, see 3GPP TS 23.501 [2].

5.3.75.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
configurable5QIs	M	T	T	F	T

5.3.75.3 Attribute constraints

None.

5.3.75.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.76 FiveQICharacteristics <<dataType>>

5.3.76.1 Definition

This data type specifies the 5QI value and the cooresponding QoS characteristics for a configurable 5QI.

5.3.76.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
fiveQIValue	M	T	T	F	T
resourceType	M	T	T	F	T
priorityLevel	O	T	T	F	T
packetDelayBudget	O	T	T	F	T
packetErrorRate	O	T	T	F	T
averagingWindow	O	T	T	F	T
maximumDataBurstVolume	O	T	T	F	T

5.3.76.3 Attribute constraints

None

5.3.76.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.3.77 PacketErrorRate <<dataType>>

5.3.77.1 Definition

This data type specifies the Packet Error Rate of a configurable 5QI.

5.3.77.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
scalar	M	T	T	F	T
exponent	M	T	T	F	T

5.3.77.3 Attribute constraints

None

5.3.77.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.3.78 FiveQiDscpMappingSet

5.3.78.1 Definition

This IOC specifies the set of mapping between 5QIs and DSCP.

5.3.78.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
fiveQiDscpMappingList	M	T	T	F	T

5.3.78.3 Attribute constraints

None.

5.3.78.4 Notifications

The common notifications defined in subclause 5.5 are valid for this IOC, without exceptions or additions.

5.3.79 FiveQiDscpMapping <<dataType>>

5.3.79.1 Definition

This data type specifies the mapping between 5QIs to DSCP.

5.3.79.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
fiveQIValues	M	T	T	F	T
dscp	M	T	T	F	T

5.3.79.3 Attribute constraints

None

5.3.79.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

5.4 Attribute definitions

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: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: 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: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
aMFSetMemberList	It is the list of DNs of AMFFunction instances of the AMFSet. allowedValues: N/A	type: DN multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: None isNullable: 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: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: 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: String multiplicity: 2 isOrdered: True isUnique: N/A defaultValue: None isNullable: 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: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: 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/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
cNSIIdList	It is a set of NSI ID. NSI ID is an identifier for identifying the Core Network part of a Network Slice instance when multiple Network Slice instances of the same Network Slice are deployed, and there is a need to differentiate between them in the 5GC, see clause 3.1 of TS 23.501 [2] and subclause 6.1.6.2.7 of 3GPP TS 29.531 [24].	type: String multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: 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: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False

sBIServiceList	It is used to indicate the all supported NF services registered on service-based interface.	type: String multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: 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: Integer multiplicity: 1..* isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
supportedBMOList	It is used to indicate the list of supported BMOs (Bridge Managed Objects) required for integration with TSN system.	type: String multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False

managedNFProfile	This parameter defines profile for managed NF (See TS 23.501 [22]). allowedValues: N/A	type: ManagedNFProfile multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: 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: String multiplicity: 1 isOrdered: F isUnique: N/A defaultValue: None isNullable: False
nfType	This parameter defines type of Network Function allowedValues: See TS 23.501[22] for NF types	type: ENUM multiplicity: 1..* isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
fqdn	This parameter defines FQDN of the Network Function (See TS 23.003 [5]) allowedValues: N/A	type: String multiplicity: 1 isOrdered: F isUnique: N/A defaultValue: None isNullable: False
ipAddress	This parameter defines IP Address of the Network Function. It can be IPv4 address (See RFC 791 [37]) or IPv6 address (See RFC 2373 [38]). allowedValues: N/A	type: String multiplicity: 1 isOrdered: F isUnique: N/A defaultValue: None isNullable: 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: String multiplicity: 1 isOrdered: F isUnique: N/A defaultValue: None isNullable: 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: String multiplicity: 1 isOrdered: F isUnique: N/A defaultValue: None isNullable: 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: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
nFInfo	This parameter includes NF specific data in Managed NF profile allowedValues: N/A	type: NFInfo multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
hostAddr	This parameter defines host address of a NF allowedValues: N/A	type: HostAddr multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: 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: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: 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: ENUM multiplicity: 1..* isOrdered: N/A isUnique: False defaultValue: None isNullable: 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: String multiplicity: 1 isOrdered: F isUnique: N/A defaultValue: None isNullable: False
smfServingAreas	This parameter defines the SMF service area(s) the UPF can serve (See TS 29.510[23]). allowedValues: N/A	type: String multiplicity: 1..* isOrdered: F isUnique: True defaultValue: None isNullable: False
isESCoveredBy	This indicates whether the adjacentCell provides no, partial or full coverage for the cell which name-contains the NRCellRelation 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 state is about to be changed to energySaving. All adjacent cells with this attribute value equal to "PARTIAL" are recommended to be considered as entirety of candidate cells to take over the coverage when the original cell state is about to be changed to energySaving. allowedValues: NO, PARTIAL, FULL	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
commModelList	The attribute specifies a list of commModel which is defined as a datatype (see clause 5.3.69). It can be used by NF and NF services to interact with each other in 5G Core network (see TS 23.501 [2]). allowedValues: Not applicable	type: commModel multiplicity: 1..* isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

groupId	This parameter identiies a list of target NF services on which the same communication model is applied to. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: False defaultValue: None isNullable: 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: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
targetNFServiceList	This parameter lists target NF services sharing same communication model and configuration. allowedValues: N/A	type: DN multiplicity: 1..* isOrdered: F isUnique: N/A defaultValue: None isNullable: False
commModelConfiguration	This parameter defines configuration parameters for specific communication model for a group of NF Services. allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
supportedFuncList	This parameter lists functionalities supported by a SCP. Refer to TS 23.501 [2].	type: SupportedFunction multiplicity: 1..* isOrdered: N/A isUnique: False defaultValue: None isNullable: False
address	This parameter defines address of a SCP instance, it can be IP address (either IPv4 address (See RFC 791 [37]) or IPv6 address (See RFC 2373 [38])) or FQDN (See TS 23.003 [5]).	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
function	This parameter defines name of a functionality supported by a SCP.	type: String multiplicity: 1 isOrdered: F isUnique: N/A defaultValue: None isNullable: False
policy	This parameter defines configuration policies of a functionality supported by a SCP.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
capabilityList	This parameter lists capabilities supported by a NEF. Refer to TS 23.501 [2]. allowedValues: N/A	type: String multiplicity: 1..* isOrdered: N/A isUnique: False defaultValue: None isNullable: False
isINEF	This parameter defines if the NEF is an Intermediate NEF. allowedValues: TRUE, FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False

isCAPIFSup	This parameter defines if the NEF support Common API Framework. allowedValues: TRUE, FALSE	type: Boolean multiplicity: 1 isOrdered: F isUnique: N/A defaultValue: None isNullable: False
sEPPType	This parameter defines the type of a SEPP entity. Refer to TS 33.501 [52]. allowedValues: “CSEPP”, “PSEPP”	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: False defaultValue: None isNullable: False
sEPPId	This parameter is identifier of a SEPP, it is unique inside a PLMN. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
remotePlmnId	This parameter defines PLMNId of the remote SEPP. allowedValues: N/A	Type: PLMNId multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
remoteSeppAddress	This parameter defines address of the remote SEPP. It can be IP address (either IPv4 address (See RFC 791 [37]) or IPv6 address (See RFC 2373 [38])) or FQDN(See TS 23.003 [5]). allowedValues: N/A	type: String multiplicity: 1 isOrdered: F isUnique: N/A defaultValue: None isNullable: False
remoteSeppId	This parameter defines identifier of the remote SEPP. it is unique inside a PLMN. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
n32cParas	This attribute is used to configure parameters to establish security link between two SEPPs. allowedValues: N/A	type: String multiplicity: 1 isOrdered: F isUnique: N/A defaultValue: None isNullable: False
n32fPolicy	This attribute is used to configure policies to protect the messages exchanged between SEPPs. allowedValues: N/A	type: String multiplicity: 1 isOrdered: F isUnique: N/A defaultValue: None isNullable: False
withIPX	This attribute defines if there’s an IPX interconnected between two SEPPs. allowedValues: TRUE, FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
FiveQiDscpMappingList	It provides the list of mapping between 5QIs and DSCP. allowedValues: N/A	type: FiveQiDscpMapping multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

fiveQIValues	It indicates a list of 5QI value. allowedValues: 0 - 255	type: Integer multiplicity: * isOrdered: N/A isUnique: Yes defaultValue: None isNullable: False
dscp	It indicates a DSCP. allowedValues: 0 - 255	type: Integer multiplicity: 1 isOrdered: N/A isUnique: Yes defaultValue: None isNullable: False
configurable5QISetRef	This is the DN of Configurable5QISet. allowedValues: DN of the Configurable5QISet MOI.	type: String multiplicity: 0..1 isOrdered: False isUnique: True defaultValue: None isNullable: True
configurable5QIs	It indicates the configurable 5QIs, including their QoS characteristics. allowedValues: N/A	type: FiveQICharacteristics multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
fiveQIValue	It identifies the 5QI value. allowedValues: 0 - 255	type: Integer multiplicity: 1 isOrdered: N/A isUnique: Yes defaultValue: None isNullable: False
resourceType	It indicates the Resource Type of a 5QI, as specified in TS 23.501 [2]. allowedValues: “GBR”, “Non-GBR”	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: False defaultValue: None isNullable: False
priorityLevel	It indicates the Priority Level of a 5QI, as specified in TS 23.501 [2]. allowedValues: 0 - 127	type: Integer multiplicity: 1 isOrdered: N/A isUnique: False defaultValue: None isNullable: False
packetDelayBudget	It indicates the Packet Delay Budget (in unit of 0.5ms) of a 5QI, as specified in TS 23.501 [2]. allowedValues: 0 - 1023	type: Integer multiplicity: 1 isOrdered: N/A isUnique: False defaultValue: None isNullable: False
packetErrorRate	It indicates the Packet Error Rate of a 5QI, as specified in TS 23.501 [2]. allowedValues: N/A	type: PacketErrorRate multiplicity: 1 isOrdered: N/A isUnique: False defaultValue: None isNullable: False
averagingWindow	It indicates the Averaging Window (in unit of ms) of a 5QI, as specified in TS 23.501 [2]. allowedValues: 0 - 4095	type: Integer multiplicity: 1 isOrdered: N/A isUnique: False defaultValue: None isNullable: False

maximumDataBurstVolume	It indicates the Maximum Data Burst Volume (in unit of Byte) of a 5QI, as specified in TS 23.501 [2]. allowedValues: 0 - 4095	type: Integer multiplicity: 1 isOrdered: N/A isUnique: False defaultValue: None isNullable: False
scalar	The Packet Error Rate of a 5QI expressed as *Scalar* x 10-k where k is the *Exponent*. This attriutes indicates the *Scalar* of this expression. allowedValues: 0 - 9	type: Integer multiplicity: 1 isOrdered: N/A isUnique: False defaultValue: None isNullable: False
exponent	The Packet Error Rate of a 5QI expressed as *Scalar* x 10-k where k is the *Exponent*. This attriutes indicates the *Exponent* of this expression. allowedValues: 0 - 9	type: Integer multiplicity: 1 isOrdered: N/A isUnique: False defaultValue: None isNullable: False
gtpUPathQoSMonitoringState	It indicates the state of GTP-U path QoS monitoring for URLLC service. allowedValues: "Enabled", "Disabled".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Enabled isNullable: False
gtpUPathMonitoredSNSSAIs	It specifies the S-NSSAIs for which the GTP-U path QoS monitoring is to be performed. allowedValues: See 3GPP TS 23.003 [13]	type: S-NSSAI multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
monitoredDSCPs	It specifies the DSCPs for which the GTP-U path QoS monitoring is to be performed. allowedValues: See 3GPP TS 29.244 [56]	type: Integer multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
isEventTriggeredGtpUPathMonitoringSupported	It indicates whether the event triggered GTP-U path QoS monitoring reporting based on thresholds is supported, see 3GPP TS 29.244 [56]. allowedValues: “Yes”, “No”.	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Yes isNullable: False
isPeriodicGtpUMonitoringSupported	It indicates whether the periodic GTP-U path QoS monitoring reporting is supported, see 3GPP TS 29.244 [56]. allowedValues: “Yes”, “No”.	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Yes isNullable: False
isImmediateGtpUMonitoringSupported	It indicates whether the immediate GTP-U path QoS monitoring reporting is supported, see 3GPP TS 29.244 [56]. allowedValues: “Yes”, “No”.	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Yes isNullable: False
gtpUPathDelayThresholds	It specifies the thresholds for reporting the packet delay for the GTO-U path QoS monitoring, if the isEventTriggeredGtpUPathMonitoringSupported attribute of the same MOI is set to “yes”. The packet delay will be reported to SMF when it exceeds the threshold (in milliseconds). allowedValues: N/A.	type: GtpUPathDelayThresholdsType multiplicity: 1 isOrdered: Y isUnique: N/A defaultValue: None isNullable: False

gtpUPathMinimumWaitTime	It specifies the minimum waiting time (in seconds) between two consecutive reports for event triggered GTP-U path QoS monitoring reporting, if the isEventTriggeredGtpUPathMonitoringSupported attribute of the same MOI is set to “yes”. allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
gtpUPathMeasurementPeriod	It specifies the period (in seconds) for reporting the packet delay for GTP-U path QoS monitoring, if the isPeriodicGtpUMonitoringSupported attribute of the same MOI is set to “yes”. allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
n3AveragePacketDelayThreshold	It specifies the threshold for reporting the average packet delay of a GTP-U path on N3 interface. allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
n3MinPacketDelayThreshold	It specifies the threshold for reporting the minimum packet delay of a GTP-U path on N3 interface. allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
n3MaxPacketDelayThreshold	It specifies the threshold for reporting the maxinum packet delay of a GTP-U path on N3 interface. allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
n9AveragePacketDelayThreshold	It specifies the threshold for reporting the average packet delay of a GTP-U path on N9 interface. allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
n9MinPacketDelayThreshold	It specifies the threshold for reporting the minimum packet delay of a GTP-U path on N9 interface. allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
n9MaxPacketDelayThreshold	It specifies the threshold for reporting the maxinum packet delay of a GTP-U path on N9 interface. allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
qFQoSMonitoringState	It indicates the state of QoS monitoring per QoS flow per UE for URLLC service. allowedValues: "Enabled", "Disabled".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Enabled isNullable: False

qFMonitoredSNSSAIs	It specifies the S-NSSAIs for which the QoS monitoring per QoS flow per UE is to be performed. allowedValues: See 3GPP TS 23.003 [13]	type: S-NSSAI multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
qFMonitored5QIs	It specifies the 5QIs for which the QoS monitoring per QoS flow per UE is to be performed. allowedValues: See 3GPP TS 23.501[2]	type: Integer multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
isEventTriggeredQFMonitoringSupported	It indicates whether the event based QoS monitoring reporting per QoS flow per UE is supported, see 3GPP TS 29.244 [56]. allowedValues: "Yes", "No".	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Yes isNullable: False
isPeriodicQFMonitoringSupported	It indicates whether the periodic QoS monitoring reporting per QoS flow per UE is supported, see 3GPP TS 29.244 [56]. allowedValues: "Yes", "No".	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Yes isNullable: False
isSessionReleasedQFMonitoringSupported	It indicates whether the session release based QoS monitoring reporting per QoS flow per UE is supported, see 3GPP TS 29.244 [56]. allowedValues: "Yes", "No".	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Yes isNullable: False
qFPacketDelayThresholds	It specifies the thresholds for reporting the packet delay between PSA and UE for QoS monitoring per QoS flow per UE, if the isEventTriggeredQFMonitoringSupported attribute of the same MOI is set to "yes".". The packet delay will be reported by PSA UPF to SMF when it exceeds the threshold (in milliseconds). allowedValues: see 3GPP TS 29.244 [56].	type: QFPacketDelayThresholdsType multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
qFMinimumWaitTime	It specifies the minimum waiting time (in seconds) between two consecutive reports for event triggered QoS monitoring reporting per QoS flow per UE, if the isEventTriggeredQFMonitoringSupported attribute of the same MOI is set to "yes". allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
qFMeasurementPeriod	It specifies the period (in seconds) for reporting the packet delay for QoS monitoring per QoS flow per UE, if the isPeriodicQFMonitoringSupported attribute of the same MOI is set to "yes". allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
thresholdDl	It specifies the threshold for reporting the DL packet delay between PSA UPF and UE. allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
thresholdUl	It specifies the threshold for reporting the UL packet delay between PSA UPF and UE. allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

thresholdRtt	It specifies the threshold for reporting the round-trip packet delay between PSA UPF and UE. allowedValues: see 3GPP TS 29.244 [56].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

5.5 Common notifications

5.5.1 Alarm notifications

This clause presents a list of notifications, defined in TS 28.532 [35], that an MnS consumer may receive. The notification header attribute `objectClass/objectInstance` shall capture the DN of an instance of a class defined in the present document.

Name	Qualifier	Notes
notifyNewAlarm	M	--
notifyClearedAlarm	M	--
notifyAckStateChanged	M	--
notifyAlarmListRebuilt	M	--
notifyChangedAlarm	O	--
notifyCorrelatedNotificationChanged	O	--
notifyChangedAlarmGeneral	O	--
notifyComments	O	--
notifyPotentialFaultyAlarmList	O	--

5.5.2 Configuration notifications

This clause presents a list of notifications, defined in TS 28.532 [35], that an MnS consumer may receive. The notification header attribute `objectClass/objectInstance` shall capture the DN of an instance of a class defined in the present document.

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

6 Information model definitions for network slice NRM

6.1 Imported information entities and local labels

Label reference	Local label
TS 28.622 [30], IOC, Top	Top
TS 28.622 [30], IOC, SubNetwork	SubNetwork
TS 28.622 [30], IOC, ManagedFunction	ManagedFunction
TS 28.658 [19], dataType, PLMNId	PLMNId

6.2 Class diagram

6.2.1 Relationships

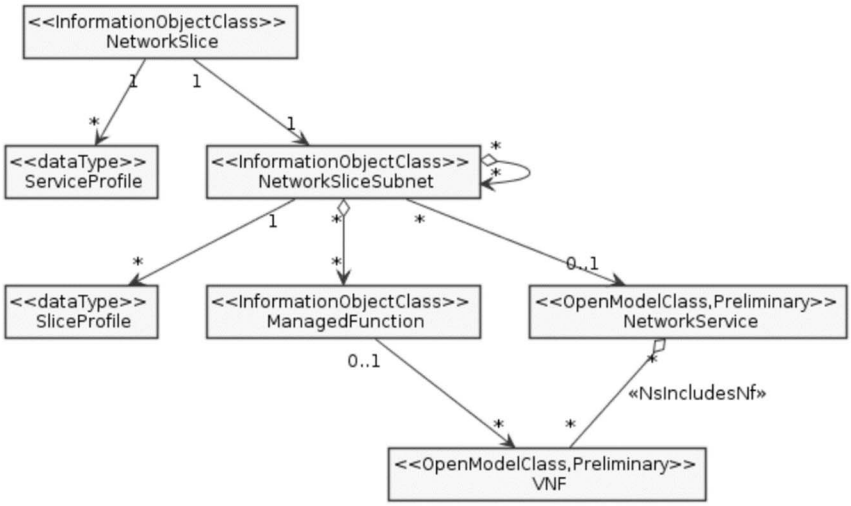

Figure 6.2.1-1: Network slice NRM fragment relationship

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

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

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

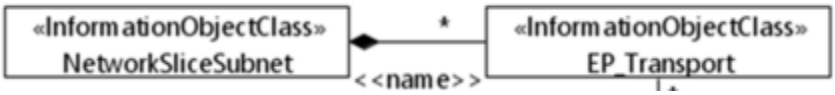

Figure 6.2.1-2: Transport EP NRM fragment relationship

6.2.2 Inheritance

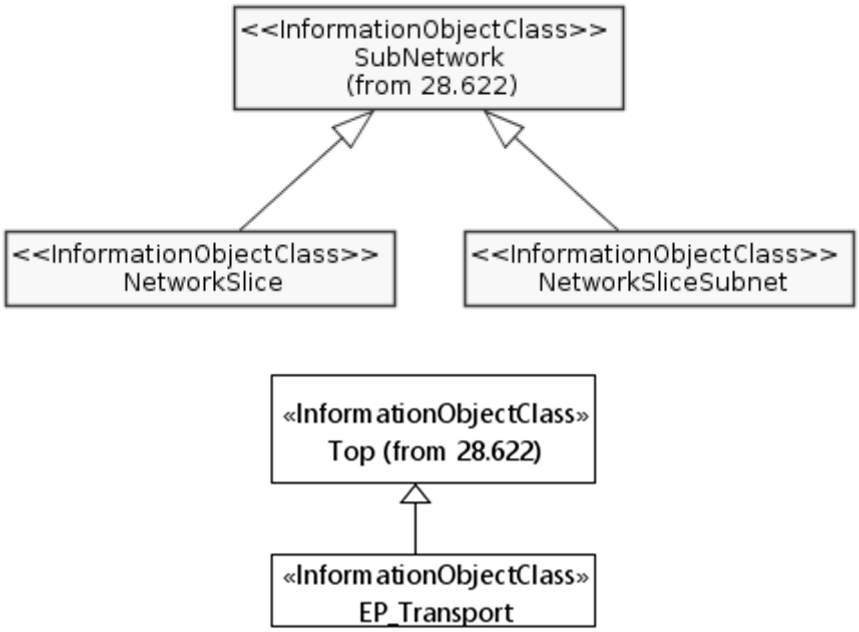

Figure 6.2.2-1: Network slice inheritance relationship

6.3 Class definitions

6.3.1 NetworkSlice

6.3.1.1 Definition

This IOC represents the properties of a network slice instance in a 5G network. For more information about the network slice instance, see 3GPP TS 28.531 [26].

6.3.1.2 Attributes

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

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
operationalState	M	T	F	F	T
administrativeState	M	T	T	F	T
serviceProfileList	M	T	T	F	T
Attribute related to role					
networkSliceSubnetRef	M	T	F	F	T

6.3.1.3 Attribute constraints

None.

6.3.1.4 Notifications

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

6.3.2 NetworkSliceSubnet

6.3.2.1 Definition

This IOC represents the properties of a network slice subnet instance in a 5G network. For more information about the network slice subnet instance, see 3GPP TS 28.531 [26].

6.3.2.2 Attributes

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

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
operationalState	M	T	F	F	T
administrativeState	M	T	T	F	T
nsInfo	CM	T	F	F	T
sliceProfileList	M	T	T	F	T
Attribute related to role					
managedFunctionRef	M	T	F	F	T
networkSliceSubnetRef	M	T	F	F	T

6.3.2.3 Attribute constraints

Name	Definition
nsInfo Support Qualifier	Condition: It shall be supported if the NSS instance is realized in the virtualized environment. Otherwise this attribute shall be absent.

6.3.2.4 Notifications

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

6.3.3 ServiceProfile <<dataType>>

6.3.3.1 Definition

This data type represents the properties of network slice related requirement that should be supported by the network slice instance in 5G network. The network slice can be tailored based on the specific requirements adhered to SLA agreed between Network Slice Customer (NSC) and Network Slice Provider (NSP), see clause 2 of [50]. A network slicing provider may add additional requirements not directly derived from SLA's, associated to the provider internal [business] goals. The GST defined by GSMA (see [50]) and the service performance requirements defined in 3GPP TS 22.261 [28] and TS 22.104 [51] are all considered as input for the network slice related requirements.

6.3.3.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
serviceProfileId	M	T	F	T	T
sNSSAIList	M	T	T	F	T
pLMNIdList	M	T	T	F	T
maxNumberofUEs	O	T	T	F	T
coverageArea	O	T	T	F	T
latency	O	T	T	F	T
uEMobilityLevel	O	T	T	F	T
resourceSharingLevel	O	T	T	F	T
sST	M	T	T	F	T
availability	O	T	T	F	T
delayTolerance	O	T	T	F	T
deterministicComm	O	T	T	F	T
dLThptPerSlice	O	T	T	F	T
dLThptPerUE	O	T	T	F	T
uLThptPerSlic	O	T	T	F	T
uLThptPerUE	O	T	T	F	T
maxPktSize	O	T	T	F	T
maxNumberofConns	O	T	T	F	T
kPIMonitoring	O	T	T	F	T
supportedAccessTech	O	T	T	F	T
userMgmtOpen	O	T	T	F	T
v2XCommModels	O	T	T	F	T
termDensity	O	T	T	F	T
activityFactor	O	T	T	F	T
uESpeed	O	T	T	F	T
jitter	O	T	T	F	T
survivalTime	O	T	T	F	T
reliability	O	T	T	F	T

6.3.3.3 Attribute constraints

None.

6.3.3.4 Notifications

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

6.3.4 SliceProfile <<dataType>>

6.3.4.1 Definition

This data type represents the properties of network slice subnet related requirement that should be supported by the network slice subnet instance in a 5G network.

6.3.4.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
sliceProfileId	M	T	F	T	T
sNSSAIList	M	T	T	F	T
pLMNIdList	M	T	T	F	T
perfReq	M	T	T	F	T
maxNumberofUEs	O	T	T	F	T
coverageAreaTAList	O	T	T	F	T
latency	O	T	T	F	T
uEMobilityLevel	O	T	T	F	T
resourceSharingLevel	O	T	T	F	T

6.3.4.3 Attribute constraints

None.

6.3.4.4 Notifications

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

6.3.5 NsInfo <<dataType>>

6.3.5.1 Definition

This data type represents the properties of network service information (See clause 8.3.3.2.2 of ETSI GS NFV-IFA 013 [29]) corresponding to the network slice subnet instance.

6.3.5.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
nSInstanceId	M	T	F	F	T
nsName	O	T	F	F	T
description	O	T	F	F	T

6.3.5.3 Attribute constraints

None.

6.3.5.4 Notifications

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

6.3.6 ServAttrCom <<dataType>>

6.3.x.1 Definition

This data type represents the common properties of service requirement related attributes (see GSMA NG.116 [50] corresponding to Attribute categories, tagging and exposure).

6.3.6.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
category	M	T	F	F	T
tagging	CM	T	F	F	T
exposure	M	T	F	F	T

6.3.6.3 Attribute constraints

Name	Definition
tagging Support Qualifier	Condition: It shall be supported if the category is character. Otherwise this attribute shall be absent.

6.3.6.4 Notifications

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

6.3.7 DelayTolerance<<dataType>>

6.3.7.1 Definition

This data type represents the delay tolerance (See Clause 3.4.3 of GSMA NG.116 [50]).

6.3.7.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	F	T
support	M	T	F	F	T

6.3.7.3 Attribute constraints

None.

6.3.7.4 Notifications

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

6.3.7 DeterminComm <<dataType>>

6.3.7.1 Definition

This data type represents the properties of the deterministic communication for periodic user traffic. Periodic traffic refers to the type of traffic with periodic transmissions.

6.3.7.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	F	T
availability	M	T	F	F	T
periodicityList	M	T	T	F	T

6.3.7.3 Attribute constraints

None.

6.3.7.4 Notifications

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

6.3.8 DLThpt<<dataType>>

6.3.8.1 Definition

This data type represents the downlink throughput per slice or per UE (See Clause 3.4.5 and 3.4.6 of GSMA NG.116 [50]).

6.3.8.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	F	T
guaThpt	M	T	F	F	T
maxThpt	C	T	F	F	T

6.3.8.3 Attribute constraints

None.

6.3.8.4 Notifications

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

6.3.9 ULThpt<<dataType>>

6.3.9.1 Definition

This data type represents the uplink throughput per slice or per UE (See Clause 3.4.31 and 3.4.32 of GSMA NG.116 [50]).

6.3.9.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	F	T
guaThpt	O	T	F	F	T
maxThpt	O	T	F	F	T

6.3.9.3 Attribute constraints

None.

6.3.9.4 Notifications

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

6.3.10 MaxPktSize <<dataType>>

6.3.10.1 Definition

This data type represents the maximum packet size (See Clause 3.4.11 of GSMA NG.116 [50]).

6.3.10.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	F	T
maxSize	M	T	F	F	T

6.3.10.3 Attribute constraints

None.

6.3.10.4 Notifications

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

6.3.11 MaxNumberofConns <<dataType>>

6.3.11.1 Definition

This data type represents maximun number of connections (See Clause 3.4.15 of GSMA NG.116 [50]).

6.3.11.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	F	T
nOofConn	M	T	F	F	T

6.3.11.3 Attribute constraints

None.

6.3.11.4 Notifications

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

6.3.12 SupportedAccessTech<<dataType>>

6.3.12.1 Definition

This data type represents supported access technologies (See Clause 3.4.27 of GSMA NG.116 [50]).

6.3.12.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	F	T
accTechList	M	T	F	F	T

6.3.12.3 Attribute constraints

None.

6.3.12.4 Notifications

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

6.3.13 KPIMonitoring <<dataType>>

6.3.13.1 Definition

This data type represents performance monitoring (See Clause 3.4.17 of GSMA NG.116 [50]).

6.3.13.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	F	T
kPIList	M	T	F	F	T

6.3.13.3 Attribute constraints

None.

6.3.13.4 Notifications

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

6.3.14 UserMgmtOpen<<dataType>>

6.3.14.1 Definition

This data type represents User management openness (See Clause 3.4.33 of GSMA NG.116 [50]).

6.3.14.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	F	T
support	M	T	F	F	T

6.3.14.3 Attribute constraints

None.

6.3.14.4 Notifications

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

6.3.15 V2XCommMode<<dataType>>

6.3.15.1 Definition

This data type represents V2X communication mode (See Clause 3.4.35 of GSMA NG.116 [50]).

6.3.15.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	F	T
v2XMode	M	T	F	F	T

6.3.15.3 Attribute constraints

None.

6.3.15.4 Notifications

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

6.3.16 TermDensity<<dataType>>

6.3.16.1 Definition

This data type represents Terminal density (See Clause 3.4.30 of GSMA NG.116 [50]).

6.3.16.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	F	T
density	M	T	F	F	T

6.3.16.3 Attribute constraints

None.

6.3.16.4 Notifications

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

6.3.17 EP_Transport

6.3.17.1 Definition

This IOC represents the logical transport interface or endpoint which including transport level information, e.g. transport address, reachability information and QoS profiles, etc.

The IOC is inherited from Top IOC.

6.3.17.2 Attributes

The EP_Transport 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
ipAddress	M	T	F	F	T
logicInterfaceId	M	T	T	F	T
nextHopInfo	O	T	F	F	T
qosProfile	O	T	T	F	T

6.3.17.3 Attribute constraints

None.

6.3.17.4 Notifications

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

6.4 Attribute definition

6.4.1 Attribute properties

Attribute Name	Documentation and Allowed Values	Properties
availability	This parameter specifies the communication service availability requirement, expressed as a percentage. The communication service availability is defined in clause 3.1 of TS 22.261 [28].	type: Float multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: True
serviceProfileId	A unique identifier of property of network slice related requirement should be supported by the network slice instance.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
sliceProfileId	A unique identifier of the property of network slice subnet related requirement should be supported by the network slice subnet instance.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
operationalState	It indicates the operational state of the network slice instance or the network slice subnet instance. It describes whether or not the resource is physically installed and working. allowedValues: "ENABLED", "DISABLED". The meaning of these values is as defined in 3GPP TS 28.625 [17] and ITU-T X.731 [18].	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
administrativeState	It indicates the administrative state of the network slice instance or the network slice subnet instance. It describes the permission to use or prohibition against using the instance, imposed through the OAM services. allowedValues: “LOCKED”, “UNLOCKED”, SHUTTINGDOWN” The meaning of these values is as defined in 3GPP TS 28.625 [17] and ITU-T X.731 [18].	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
nsInfo	This attribute contains the NsInfo of the NS instance corresponding to the network slice subnet instance. The NsInfo is described in clause 8.3.3.2.2 of ETSI GS NFV-IFA 013 [29].	type: NsInfo multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: No default value isNullable: True
nSInstanceId	This attribute specifies the identifier of NS instance corresponding to the network slice subnet instance. See clause 8.3.3.2.2 of ETSI GS NFV-IFA 013 [29].	type: String multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: No default value isNullable: True
nsName	This attribute specifies the name of NS instance corresponding to the network slice subnet instance. See clause 8.3.3.2.2 of ETSI GS NFV-IFA 013 [29].	type: String multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: No default value isNullable: True
description	This attribute specifies the description of NS instance corresponding to the network slice subnet instance. See clause 8.3.3.2.2 of ETSI GS NFV-IFA 013 [29].	type: String multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: No default value isNullable: True

category	This attribute specifies the category of a service requirement/attribute of GST (see GSMA NG.116 [50]). allowedValues: character, scalability	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
tagging	This attribute specifies the tagging of a service requirement/attribute of GST in character catogary (see GSMA NG.116 [50]). allowedValues: performance, function, operation	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
exposure	This attribute specifies exposure mode of a service requirement/attribute of GST (see GSMA NG.116 [50]). allowedValues: API, KPI	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
sNSSAIList	This parameter specifies the S-NSSAI list to be supported by the new NSI to be created or the existing NSI to be re-used. sNSSAList is defined in subclause 4.4.1	

perfReq	This parameter specifies the requirements to the network slice subnet in terms of the scenarios defined in the TS 22.261 [28] and TS 22.104 [51], i.e. the "performance requirements for high data rate and traffic density scenarios" in TS 22.261 [28], "periodic deterministic communication, aperiodic deterministic communication, non-deterministic communication, and mixed traffic" in TS 22.104 [51]. It is a structure containing the following elements: - list of perfReq Depending on the sST value, the list of perfReq will be - list of eMBBPerfReq or - list of uRLLCPerfReq or - list of mIoTPerfReq NOTE 1: the list of mIoTPerfReq is not addressed in the present document. allowedValues: - list of eMBBPerfReq is a list of entries where an entry identifies the performance requirements to the network slice subnet in terms of the scenarios defined in the Table 7.1-1 of TS 22.261 [28]. An entry has the following attributes: expDataRateDL (Integer), expDataRateUL (Integer), areaTrafficCapDL (Integer), areaTrafficCapUL (Integer), overallUserDensity (Integer), activityFactor (Integer), (see table 7.1-1 of TS 22.261 [28]). - list of uRLLCPerfReq is a list of entries where an entry identifies the performance requirements to the network slice subnet in terms of the scenarios defined in clauses 5.2 through 5.5 of TS 22.104 [51]. An entry has the following attributes: cSAvailabilityTarget (Float), cSReliabilityMeanTime (String), , expDataRate (Integer), msgSizeByte (String), transferIntervalTarget (String), survivalTime (String), , , (see table 5.2-1, table 5.3-1, table 5.4-1 and table 5.5-1 of TS 22.104 [51]). NOTE 2: Limitation on attribute values in instances of SliceProfile is not addressed in the present document. NOTE 3: The attributes inside perfReq here need further breaking down to define requirements for each subnetwork under different SST values.	type: PerfReq multiplicity: *1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
maxNumberofUEs	An attribute specifies the maximum number of UEs may simultaneously access the network slice instance.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
coverageAreaTAList	An attribute specifies a list of TrackingAreas where the NSI can be selected. allowedValues: Legacy TAC and Extended TAC are defined in clause 9.3.3.10 of TS 38.413 [5].	type: Integer multiplicity: 1..* isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
latency	An attribute specifies the packet transmission latency (millisecond) through the RAN, CN, and TN part of 5G network and is used to evaluate utilization performance of the end-to-end network slice instance. See clause 6.3.1 of 28.554 [27].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False

uEMobilityLevel	An attribute specifies the mobility level of UE accessing the network slice instance. See 6.2.1 of TS 22.261 [28]. allowedValues: stationary, nomadic, restricted mobility, fully mobility.	type: Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: True
serviceProfile.resourceSharingLevel	An attribute specifies whether the resources to be allocated to the network slice instance may be shared with another network slice instance(s). allowedValues: shared, non-shared.	type: Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: Yes isNullable: True
sliceProfile.resourceSharingLevel	An attribute specifies whether the resources to be allocated to the network slice subnet instance may be shared with another network slice subnet instance(s). allowedValues: shared, non-shared.	type: Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: Yes isNullable: True
serviceProfileList	An attribute specifies a list of ServiceProfile (see clause 6.3.3) supported by the network slice instance	type: ServiceProfile multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
sliceProfileList	An attribute specifies a list of SliceProfile (see clause 6.3.4) supported by the network slice subnet instance	type: SliceProfile multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
sST	This parameter specifies the slice/service type for a ServiceProfile. See clause 5.15.2 of 3GPP TS 23.501 [2].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
delayTolerance	An attribute specifies the properties of service delivery flexibility, especially for the vertical services that are not chasing a high system performance. See clause 4.3 of TS 22.104 [51].	type: DelayTolerance multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
DelayTolerance.support	An attribute specifies whether or not the NSI supports service delivery flexibility, especially for the vertical services that are not chasing a high system performance. allowedValues: "NOT SUPPORTED", "SUPPORTED".	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
deterministicComm	An attribute specifies the properties of the deterministic communication for periodic user traffic, see clause 4.3 of TS 22.104 [51].	type: <<DeterminComm>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
DeterminComm.availability	An attribute specifies whether or not the NSI supports deterministic communication for period user traffic. allowedValues: "NOT SUPPORTED", "SUPPORTED".	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False

DeterminComm.periodicityList	An attribute specifies a list of periodicities supported by the NSI for deterministic communication.	type: Float multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
dLThptPerSlice	This attribute defines achievable data rate of the network slice in downlink that is available ubiquitously across the coverage area of the slice, refer NG.116 [50].	type: DLThpt multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
dLThptPerUE	This attribute defines data rate supported by the network slice per UE, refer NG.116 [50].	type: DLThpt multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
guaThpt	This attribute describes the guaranteed data rate.	type: Float multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
maxThpt	This attribute describes the maximum data rate.	type: Float multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
uLThptPerSlice	This attribute defines achievable data rate of the network slice in uplink that is available ubiquitously across the coverage area of the slice, refer NG.116 [50].	type: ULThpt multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
uLThptPerUE	This attribute defines data rate supported by the network slice per UE, refer NG.116 [50].	type: ULThpt multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
maxPktSize	This parameter specifies the maximum packet size supported by the network slice, refer NG.116 [50].	type: MaxPktSize multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
MaxPktSize.maxsize	This parameter specifies the maximum packet size supported by the network slice, refer NG.116 [50].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
maxNumberofConns	This parameter defines the maximum number of concurrent sessions supported by the network slice, refer NG.116 [50].	type: MaxNumberofConns multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False

MaxNumberofConns.nOofConn	This parameter defines the maximum number of concurrent sessions supported by the network slice, refer NG.116 [50].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
kPIMonitoring	An attribute specifies the name list of KQIs and KPIs available for performance monitoring.	type: KPIMonitoring multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
KPIMonitoring.kPIList	An attribute specifies the name list of KQIs and KPIs available for performance monitoring.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
supportedAccessTech	An attribute specifies which access technologies are supported by the NSI.	type: SupportedAccessTech multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
SupportedAccessTech.accTechList	An attribute specifies which access technologies are supported by the NSI. allowedValues: 1: NR 2: NB-IoT 3: WI-Fi 4: Fixed access (e.g. DSL, Fibre)	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
userMgmtOpen	An attribute specifies whether or not the NSI supports the capability for the NSC to manage their users or groups of users' network services and corresponding requirements.	type: UserMgmtOpen multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
UserMgmtOpen.support	An attribute specifies whether or not the NSI supports the capability for the NSC to manage their users or groups of users' network services and corresponding requirements. allowedValues: "NOT SUPPORTED", "SUPPORTED".	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
v2XCommModels	An attribute specifies whether or not the V2X communication mode is supported by the NSI.	type: V2XCommMode multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
V2XCommMode.v2XMode	An attribute specifies whether or not the V2X communication mode is supported by the NSI. allowedValues: "NOT SUPPORTED", "SUPPORTED BY NR".	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
coverageArea	An attribute specifies the coverage area of the network slice, i.e. the geographic region where a 3GPP communication service is accessible, see Table 7.1-1 of TS 22.261 [28]) and NG.116 [50].	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True

termDensity	An attribute specifies the overall user density over the coverage area of the network slice. See Table 7.1-1 of TS 22.261 [28]).	type: TermDensity multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
TermDensity.density	An attribute specifies the overall user density over the coverage area of the network slice. See Table 7.1-1 of TS 22.261 [28]).	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
activityFactor	An attribute specfies the percentage value of the amount of simultaneous active UEs to the total number of UEs where active means the UEs are exchanging data with the network. See Table 7.1-1 of TS 22.261 [28]).	type: Float multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
uESpeed	An attribute specifies the maximum speed (in km/hour) supported by the network slice at which a defined QoS can be achieved. See Table 7.1-1 of TS 22.261 [28]).	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
jitter	An attribute specifies the deviation from the desired value to the actual value when assessing time parameters, see clause C.4.1 of TS 22.104 [51].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
survivalTime	An attribute specifies the time that an application consuming a communication service may continue without an anticipated message. See clause 5 of TS 22.104 [51]).	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
reliability	An attribute specifies in the context of network layer packet transmissions, percentage value of the amount of sent network layer packets successfully delivered to a given system entity within the time constraint required by the targeted service, divided by the total number of sent network layer packets, see TS 22.261 [28] and TS 22.104 [51].	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
NetworkSlice.networkSliceSubnetRef	This holds a DN of NetworkSliceSubnet relating to the NetworkSlice instance.	type: DN multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
NetworkSliceSubnet.networkSliceSubnetRef	This holds a list of DN of constituent NetworkSliceSubnet supporting NetworkSliceSubnet instance	type: DN multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
managedFunctionRef	This holds a list of DN of ManagedFunction instances supporting the NetworkSliceSubnet instance.	type: DN multiplicity: * isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False

ipAddress	This parameter specifies the IP address assigned to a logical transport interface/endpoint. It can be an IPv4 address (See RFC 791 [37]) or an IPv6 address (See RFC 2373 [38]).	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
logicInterfaceId	This parameter specifies the identify of a logical transport interface. It could be VLAN ID, MPLS Tag or Segment ID.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nextHopInfo	This parameter is used to identify ingress transport nodes identification. This can be any of combination of IP address of next-hop router of transport network, system name, port name, IP management address of transport nodes.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
qosProfile	This parameter specifies an QoS Profile for a logical transport interface. It is a reference to the set of profile parameters which are locally provisioned on both sides of a logical transport interface.	type: String multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: None isNullable: True

6.5 Common notifications

6.5.1 Alarm notifications

This clause presents a list of notifications, defined in TS 28.532 [35], that an MnS consumer may receive. The notification header attribute objectClass/objectInstance shall capture the DN of an instance of a class defined in the present document.

Name	Qualifier	Notes
notifyNewAlarm	M	--
notifyClearedAlarm	M	--
notifyAckStateChanged	M	--
notifyAlarmListRebuilt	M	--
notifyChangedAlarm	O	--
notifyCorrelatedNotificationChanged	O	--
notifyChangedAlarmGeneral	O	--
notifyComments	O	--
notifyPotentialFaultyAlarmList	O	--

6.5.2 Configuration notifications

This clause presents a list of notifications, defined in TS 28.532 [35], that an MnS consumer may receive. The notification header attribute objectClass/objectInstance shall capture the DN of an instance of a class defined in the present document.

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

7 Solution Set (SS)

The present document defines the following NRM Solution Set definitions for NR and NG-RAN:

- XML based 3GPP NR and NG-RAN NRM Solution Set (Annex C).
- JSON based 3GPP NR and NG-RAN NRM Solution Set (Annex D).
- YANG based 3GPP NR and NG-RAN NRM Solution Set (Annex E).

The present document defines the following NRM Solution Set definitions for 5GC:

- XML based 3GPP 5GC NRM Solution Set (Annex F).
- JSON based 3GPP 5GC NRM Solution Set (Annex G).
- YANG based 3GPP 5GC NRM Solution Set (Annex H).

The present document defines the following NRM Solution Set definitions for network slice and network slice subnet:

- XML based 3GPP Network Slice NRM Solution Set (Annex I).
- JSON based 3GPP Network Slice NRM Solution Set (Annex J).

Annex A (normative): Cell state handling

A.1 Relation between the administrative state and the "Pre-operation state of the gNB-DU Cell"

The administrative state indicates the permission to use or prohibition against using the cell, imposed through the OAM services. The administrative state has three values: "LOCKED", "SHUTTING DOWN" or "UNLOCKED"

The meanings of these values are defined in ITU-T Recommendation X.731 [18].

The relation between the administrative state and the "Pre-operation state of the gNB-DU Cell" is defined in subclause 8.5 of TS 38.401 [4]. See below an extract from subclause 8.5 of TS 38.401 [4] on the F1 startup and cell activation.

If the `operationalState` is "ENABLED" (i.e. the resource is physically installed and working) and if the `administrativeState` is "UNLOCKED", the step "0: Pre-operational state" will exit and the step "1: F1 Setup Request" will be executed."

8.5 F1 Startup and cells activation

This function allows to setup the F1 interface between a gNB-DU and a gNB-CU and it allows to activate the gNB-DU cells.

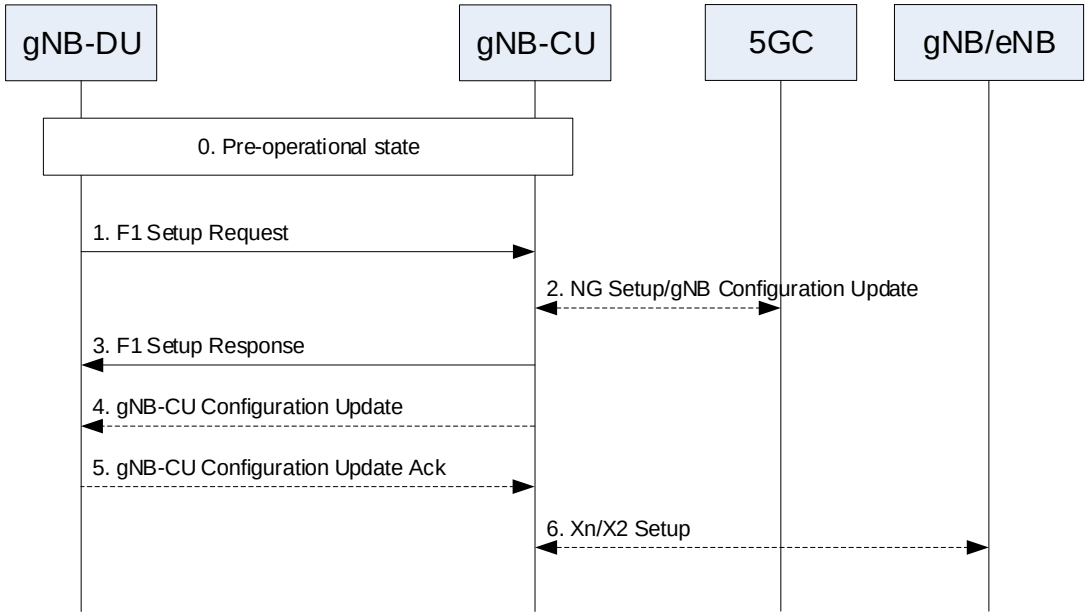

Figure 8.5-1: F1 startup and cell activation

A.2 Combined state diagram for gNB cell

This is the Combined state diagram for gNB cell.

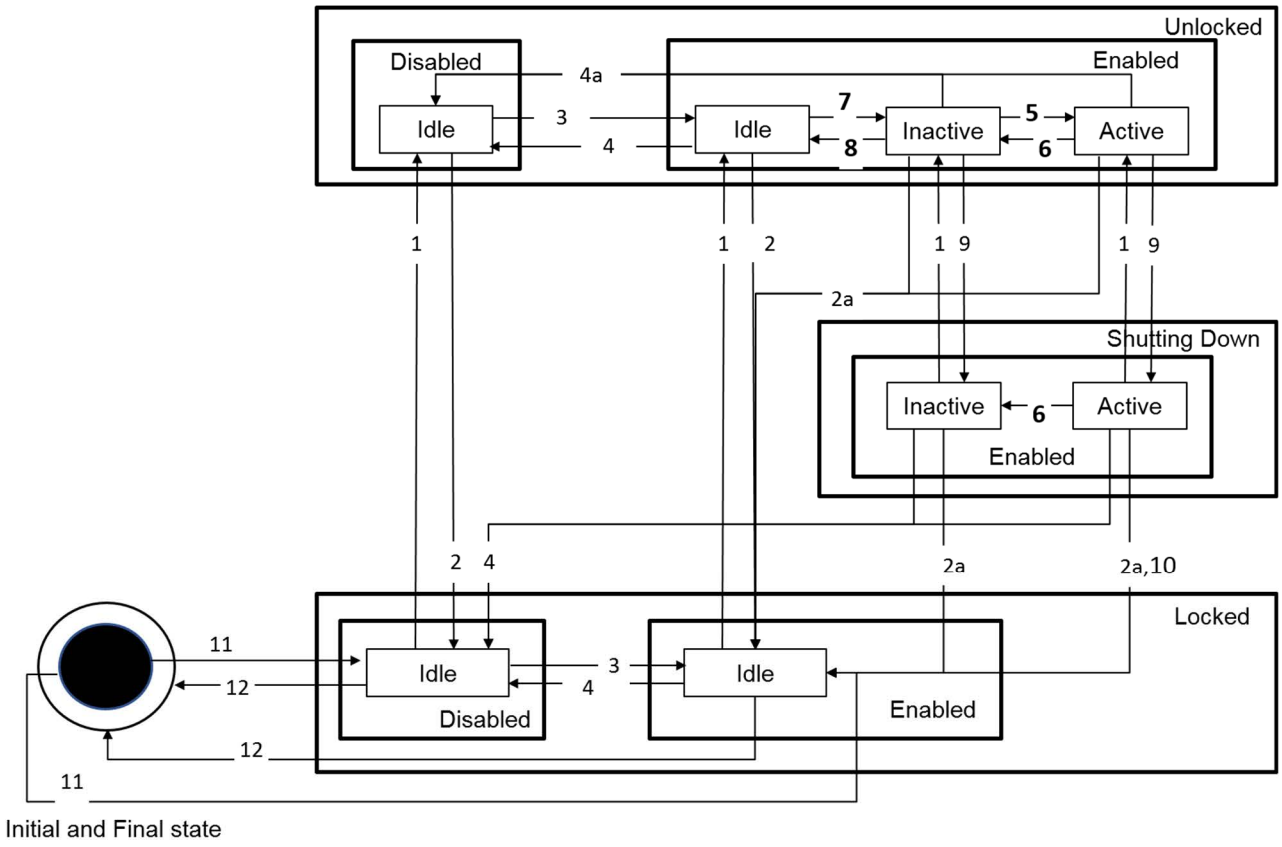

Figure A.2-1: Combined gNB cell state diagram

The gNB-DU maintains cell states. The following table is the gNB cell state transition table.

In 3-split and 2-split deployment scenarios, the interactions between gNB-CU and gNB-DU are standardized. The interactions specified under the column "The state transition events and actions" of "The gNB Cell state transition table" below shall be present for the state transition.

In the non-split deployment scenarios, the interactions between gNB-CU and gNB-DU are not standardized. The interactions between gNB-CU and gNB-DU specified under the column "The state transition events and actions" of "The gNB Cell state transition table" can be replaced by other means that is not standardized.

Table A.2-1: The gNB Cell state transition table

Transition number	The state transition event and actions
1	Event: Receive request to unlock. Action: None.
2	Event: Receive request to lock. Action: None.
2a	Event: Receive request to lock Action: Send to gNB-CU the "gNB-DU Configuration Update message" with served cell to delete.
3	Event: When the required cell resource is physically installed and working. Action: none.
4	Event: When the required cell resource is not physically installed or is not working. Action: Send to gNB-CU the "gNB-DU Configuration update message" with cell to delete.
4a	Event: When the required cell resource is physically uninstalled or is not working. Action: Send to gNB-CU the "GNB-DU Configuration Update message" with served cell to delete.
5	Event: Receive from gNB-CU the "F1 Setup Response message" (identifying the cell to be activated). The cell is activated successfully. Actions: Do nothing or send gNB-CU the "gNB-DU Configuration Update message" with Cell stated as active' ----- or ----- Event: Receive from gNB-CU the "gNB-CU Configuration Update message" (identifying cell to be activated e.g., in case that the cell was not activated using the "F1 Setup Response message"). Actions: The cell is activated successfully. Send to gNB-CU the "gNB-CU Configuration Update Response" to confirm the cell is in active state. ----- or ----- Event: Receive from gNB-CU the "gNB-DU Configuration Update Acknowledge message" (identifying cell to be activated e.g., in case that the cell was not activated using the "F1 Setup Response message") and the cell is activated successfully Actions: Do nothing.
6	Event: Receive from gNB-CU the "gNB-CU Configuration Update message" and responds with gNB-CU Configuration Update Acknowledge messages. Actions: Respond with gNB-CU Configuration Update Acknowledge messages. ----- or ----- Event: Event: DU experiences an internal failure and decided to place the cell into inactive state. Actions: Send to gNB-CU the "gNB-DU Cell status Update message"
7	Event: Send to gNB-CU the "F1 Setup request" (identifying the cell that is configured and ready to be activated). Actions: none. ----- or ----- Send to gNB-CU the "gNB-DU Configuration Update message" with the served cell to add. Actions: none.
8	Event: Sends to gNB-CU the "gNB-DU Configuration Update message" with served cell to delete. Receive response from gNB-CU the "gNB-DU Configuration Update Acknowledge message". Actions: None.
9	Event: Receive request to shut down. Actions: None.
10	Event: Last user quit. Actions: Send to gNB-CU the "GNB-DU Configuration Update message" with served cell to delete.
11	Event: When a cell is created and is configured. Actions: None

12	Event: When a cell is deleted. Action: None.

Annex B (normative): NSI and NSSI state handling

B.1 NSI state handling

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

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

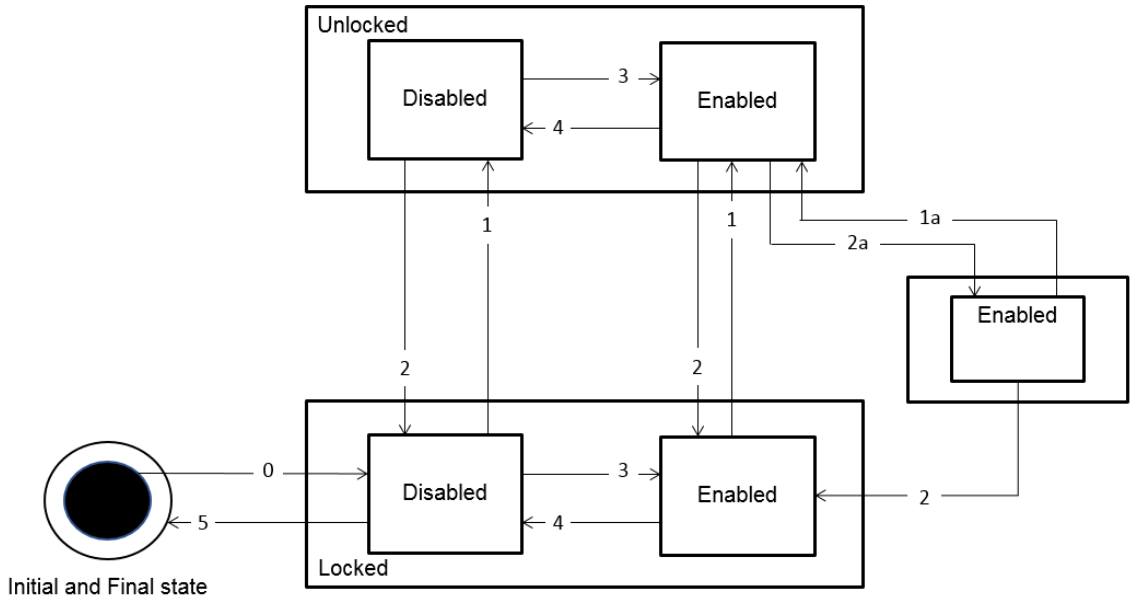

Figure B.1: Combined NSI state diagram

In an NSI deployment scenario, the interactions between communication service management function, network slice management function and network slice subnet management function are standardized. The interactions specified under the column "The state transition events and actions" of "NSI state transition table" below shall be present for the state transition.

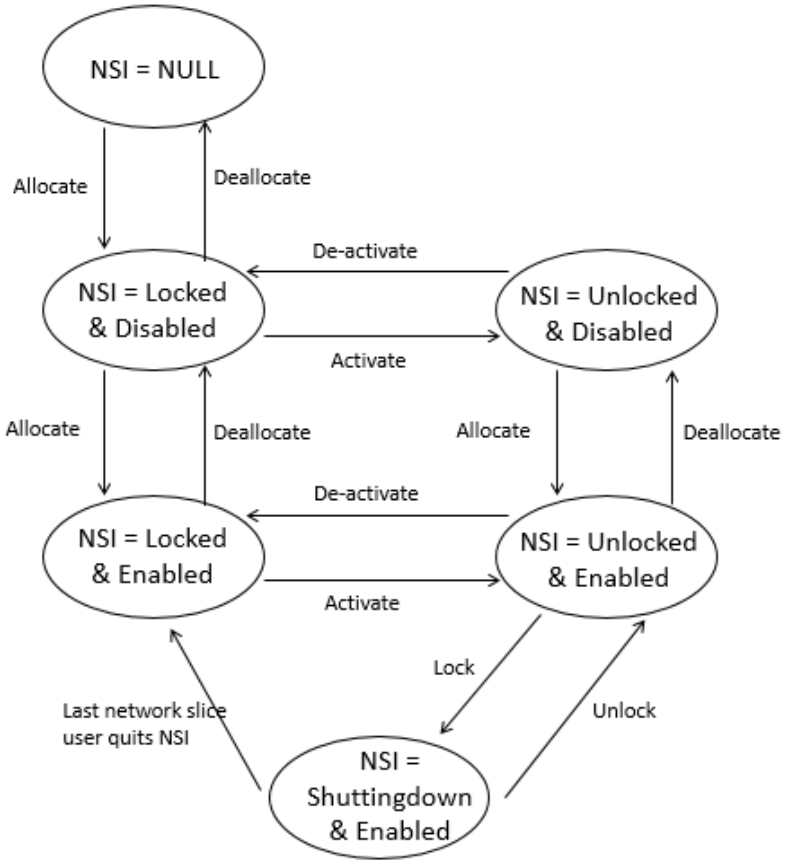

Figure B.2: NSI state diagram with state transition triggers

Table B.1: The NSI state transition table

Trigger number	The state transition events and actions
0	NSMF responds positively to the "Create NSI request" message, the NSI is created and the state is set to Locked
1	NSMF responds positively to the "Activate NSI request" message (identifying the NSI to be activated). ----- or ------ CM operation to set administrative state to Unlocked.
1a	CM Operation to set administrative state to Unlocked
2	The last user of the NSI stops using the NSI
2a	CM Operation to set administrative state to Shutting down
3	When the NSI and its constituents are installed and working NSMF receives positive response to the "Allocate NSSI" message (applicable to the NSI to be enabled).
4	When the NSI or its constituents are not installed or not working NSMF receives positive response to the "Deallocate NSSI" message (applicable to the NSI to be disabled)
5	NSMF responds positively to the "Deallocate NSI request" message, the NSI is deleted and the state is set to NULL

B.2 State handling of NSSI

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

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

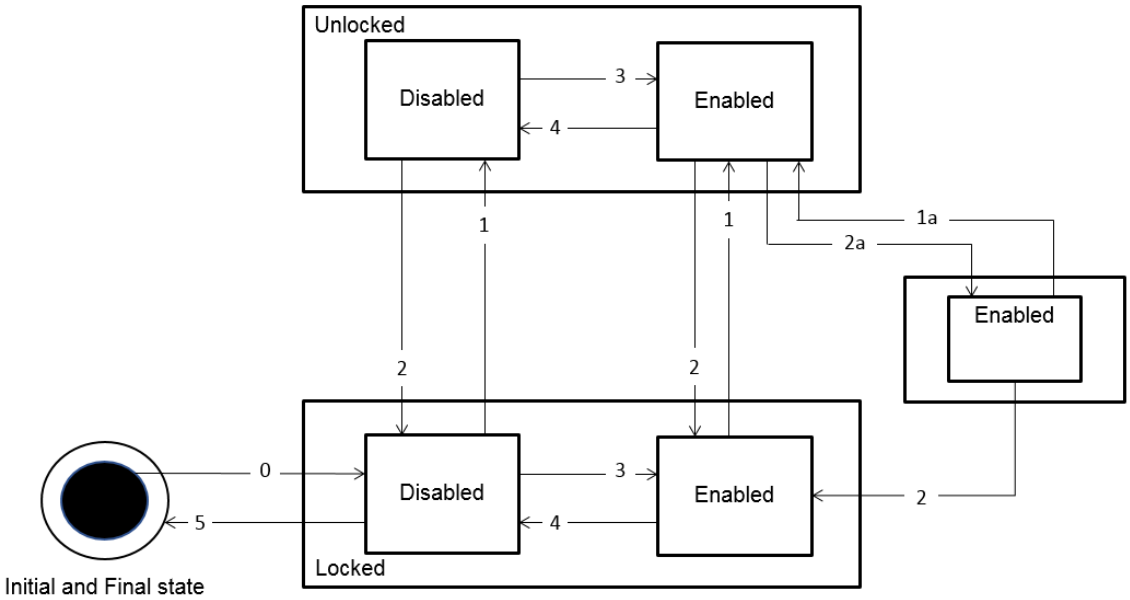

Figure B.2.1: Combined NSSI state diagram

In an NSSI deployment scenario, the interactions between CSMF, NSMF and NSSMF are standardized. The interactions specified under the column "The state transition events and actions" of "NSSI state transition table" below shall be present for the state transition.

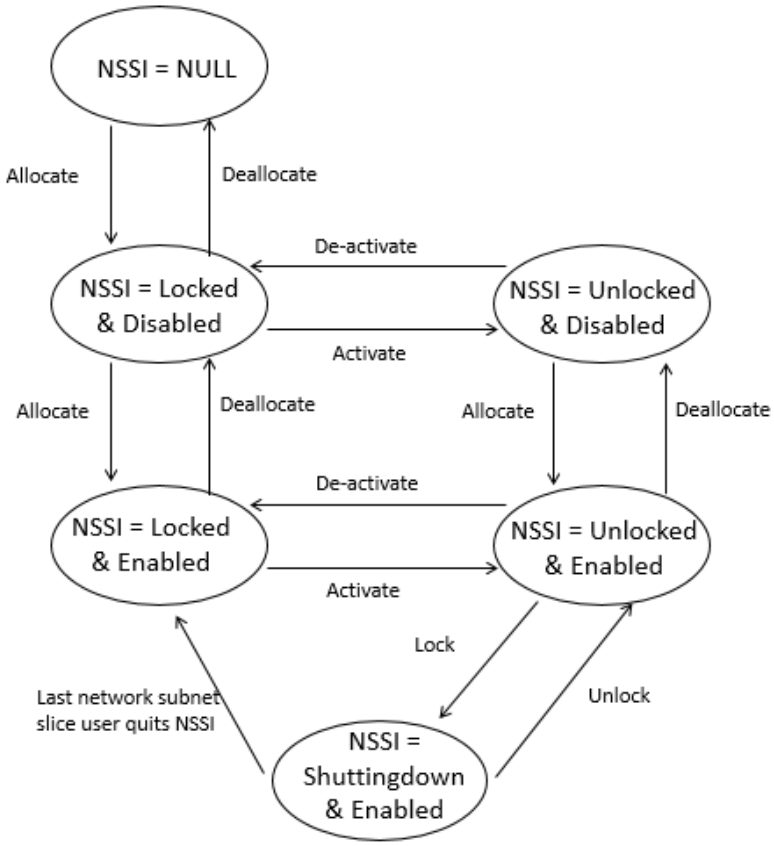

Figure B.2.2: NSSI state diagram with state transition triggers

Table B.2.1: The NSSI state transition table

Trigger number	The state transition events and actions
0	NSSMF responds positively to the "Create NSSI request" message, the NSSI is created and the state is set to Locked
1	NSSMF responds positively to the "Activate NSSI request" message (identifying the NSSI to be activated). ----- or ------ CM operation to set administrative state to Unlocked.
1a	CM Operation to set administrative state to Unlocked
2	The last user of the NSSI stops using the NSSI
2a	CM Operation to set administrative state to Shutting down
3	When the NSSI constituents are installed and working NSSMF receives positive response to the "Create NSSI constituent" message (applicable to the NSSI to be enabled).
4	When the NSSI constituents are not installed or not working NSSMF receive positive response to the "Delete NSSI constituent" message (applicable to the NSSI to be disabled)
5	NSSMF responds positively to the "Delete NSSI request" message, the NSSI is deleted and the state is set to NULL.

Annex C (normative): XML definitions for NR NRM

C.1 General

This annex contains the XML definitions for the NR and NG-RAN NRM, in accordance with NR and NG-RAN NRM Information Model definitions specified in clause 4.

C.2 Architectural features

The overall architectural feature of NR NRM information model is specified in clause 4, this clause specifies features that are specific to the Schema definitions.

The XML definitions of the present document specify the schema for a configuration content, which can be included in a configuration file for Bulk configuration management operations

C.3 Mapping

C.3.1 General mapping

An IOC maps to an XML element of the same name as the IOC's name in the Information Model. An IOC attribute maps to a sub-element of the corresponding IOC's XML element, and the name of this sub-element is the same as the attribute's name in the Information Model.

C.3.2 Information Object Class (IOC) mapping

The mapping is not present in the current version of the present document.

C.4 Solution Set definitions

C.4.1 XML definition structure

The overall description of the file format of configuration data XML files is provided by 3GPP TS 32.616 [33].

The present document defines the NRM-specific XML schema nrNrm.xsd for the NR NRM Information Model defined in clause 4.

XML schema nrNrm.xsd explicitly declares NRM-specific XML element types for the related NRM.

The definition of those NRM-specific XML element types complies with the generic mapping rules defined in 3GPP TS 32.616 [33].

C.4.2 Graphical representation

The graphical representation is not present in the current version of the present document.

C.4.3 XML schema "nRNrm.xsd"

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<!--
  3GPP TS 28.541 NR Network Resource Model
  XML schema definition
  nrNrm.xsd
-->
<schema xmlns="http://www.w3.org/2001/XMLSchema"
xmlns:xn="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"
xmlns:nn="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#nrNrm"
xmlns:en="http://www.3gpp.org/ftp/specs/archive/28_series/28.659#eutranNrm"
xmlns:epc="http://www.3gpp.org/ftp/specs/archive/28_series/28.709#epcNrm"
xmlns:sm="http://www.3gpp.org/ftp/specs/archive/28_series/28.626#stateManagementIRP"
xmlns:ngc="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#ngcNrm"
xmlns:sp="http://www.3gpp.org/ftp/specs/archive/28_series/28.629#sonPolicyNrm"
targetNamespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#nrNrm"
elementFormDefault="qualified">
<import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"/>
<import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.709#epcNrm"/>
<import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.626#stateManagementIRP"/>
<import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#ngcNrm"/>
<import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.629#sonPolicyNrm"/>

<simpleType name="GnbId">
    <restriction base="unsignedLong">
    <maxInclusive value="4294967295"/>
    </restriction>
</simpleType>
<simpleType name="GnbIdLength">
    <restriction base="integer">
    <minLength value="22"/>
    <maxLength value="32"/>
    </restriction>
</simpleType>
<simpleType name="Nci">
    <restriction base="unsignedLong">
    <maxInclusive value="68719476735"/>
    </restriction>
</simpleType>
<simpleType name="Pci">
    <restriction base="unsignedShort">
    <maxInclusive value="503"/>
    <!-- Minimum value is 0, maximum value is 3x167+2=503 -->
    </restriction>
</simpleType>
<simpleType name="NrTac">
    <restriction base="unsignedLong">
    <maxInclusive value="16777215"/>
    <!--5G TAC is 3-octets length -->
    </restriction>
</simpleType>
<simpleType name="GnbDuId">
    <restriction base="unsignedLong">
    <maxInclusive value="68719476735"/>
    <!-- Minimum value is 0, maximum value is 2^36-1=68719476735 -->
    </restriction>
</simpleType>
<simpleType name="GnbCuupId">
    <restriction base="unsignedLong">
    <maxInclusive value="68719476735"/>
    <!-- Minimum value is 0, maximum value is 2^36-1=68719476735 -->
    </restriction>
</simpleType>
<simpleType name="GnbName">
    <restriction base="string">
    <minLength value="1"/>
    <maxLength value="150"/>
    </restriction>
</simpleType>
<simpleType name="CyclicPrefix">
    <restriction base="integer">
    <enumeration value="15"/>
    <enumeration value="30"/>
    <enumeration value="60"/>
    <enumeration value="120"/>
    </restriction>
</simpleType>
<simpleType name="QuotaType">
    <restriction base="string">
    <enumeration value="STRICT"/>
```

```
    <enumeration value="FLOAT"/>
    </restriction>
</simpleType>
<simpleType name="CellState">
    <restriction base="string">
    <enumeration value="IDLE"/>
    <enumeration value="INACTIVE"/>
    <enumeration value="ACTIVE"/>
    </restriction>
</simpleType>
<simpleType name="BwpContext">
    <restriction base="string">
    <enumeration value="DL"/>
    <enumeration value="UL"/>
    <enumeration value="SUL"/>
    </restriction>
</simpleType>
<simpleType name="IsInitialBwp">
    <restriction base="string">
    <enumeration value="INITIAL"/>
    <enumeration value="OTHER"/>
    </restriction>
</simpleType>
<simpleType name="qOffsetRangeList">
    <restriction base="string">
    <enumeration value="dB-24"/>
    <enumeration value="dB-22"/>
    <enumeration value="dB-20"/>
    <enumeration value="dB-18"/>
    <enumeration value="dB-16"/>
    <enumeration value="dB-14"/>
    <enumeration value="dB-12"/>
    <enumeration value="dB-10"/>
    <enumeration value="dB-8"/>
    <enumeration value="dB-6"/>
    <enumeration value="dB-5"/>
    <enumeration value="dB-4"/>
    <enumeration value="dB-3"/>
    <enumeration value="dB-2"/>
    <enumeration value="dB-1"/>
    <enumeration value="dB0"/>
    <enumeration value="dB1"/>
    <enumeration value="dB2"/>
    <enumeration value="dB3"/>
    <enumeration value="dB4"/>
    <enumeration value="dB5"/>
    <enumeration value="dB6"/>
    <enumeration value="dB8"/>
    <enumeration value="dB10"/>
    <enumeration value="dB12"/>
    <enumeration value="dB14"/>
    <enumeration value="dB16"/>
    <enumeration value="dB18"/>
    <enumeration value="dB20"/>
    <enumeration value="dB22"/>
    <enumeration value="dB24"/>
    </restriction>
</simpleType>
<simpleType name="isESCoveredBy">
    <restriction base="string">
    <enumeration value="NO"/>
    <enumeration value="PARTIAL"/>
    <enumeration value="FULL"/>
    </restriction>
</simpleType>
<simpleType name="cellReselectionPriority">
    <restriction base="unsignedLong">
    <minInclusive value="0"/>
    <maxInclusive value="16"/>
    <!--Value 0 means lowest priority-->
    </restriction>
</simpleType>
<simpleType name="cellReselectionSubPriority">
    <restriction base="unsignedLong">
    <minInclusive value="0"/>
    <maxInclusive value="16"/>
    <!--Value 0 means lowest priority-->
    </restriction>
```

```
</simpleType>
<simpleType name="PMaxRangeType">
    <restriction base="short">
    <minInclusive value="-30"/>
    <maxInclusive value="33"/>
    </restriction>
</simpleType>
<simpleType name="qOffsetFreq">
    <restriction base="short">
    <minInclusive value="-24"/>
    <maxInclusive value="24"/>
    </restriction>
</simpleType>
<simpleType name="qQualMin">
    <restriction base="integer">
    <minInclusive value="-34"/>
    <maxInclusive value="0"/>
    </restriction>
</simpleType>
<simpleType name="qRxLevMin">
    <restriction base="integer">
    <minInclusive value="-140"/>
    <maxInclusive value="-44"/>
    </restriction>
</simpleType>
<simpleType name="Thresxhighp">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="62"/>
    </restriction>
</simpleType>
<simpleType name="Threshxhighq">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="31"/>
    </restriction>
</simpleType>
<simpleType name="Threshxlowp">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="62"/>
    </restriction>
</simpleType>
<simpleType name="Threshxlowq">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="62"/>
    </restriction>
</simpleType>
<simpleType name="Treselectionnr">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="7"/>
    </restriction>
</simpleType>
<simpleType name="Treselectionnrsfhigh">
    <restriction base="string">
    <enumeration value="25"/>
    <enumeration value="50"/>
    <enumeration value="75"/>
    <enumeration value="100"/>
    </restriction>
</simpleType>
<simpleType name="Treselectionnrsfmedium">
    <restriction base="string">
    <enumeration value="25"/>
    <enumeration value="50"/>
    <enumeration value="75"/>
    <enumeration value="100"/>
    </restriction>
</simpleType>
<simpleType name="Absolutefrequencyssb">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="3279165"/>
    </restriction>
</simpleType>
<simpleType name="Ssbsubcarrierspacing">
```

```
    <restriction base="string">
    <enumeration value="15"/>
    <enumeration value="30"/>
    <enumeration value="120"/>
    <enumeration value="240"/>
    </restriction>
</simpleType>
<simpleType name="Multifrequencybandlistnr">
    <restriction base="integer">
    <minInclusive value="1"/>
    <maxInclusive value="256"/>
    </restriction>
</simpleType>
<simpleType name="beamType">
    <restriction base="string">
    <enumeration value="SSB-BEAM"/>
    </restriction>
</simpleType>
<simpleType name="beamAzimuth">
    <restriction base="integer">
    <minInclusive value="-1800"/>
    <maxInclusive value="1800"/>
    </restriction>
</simpleType>
<simpleType name="beamTilt">
    <restriction base="integer">
    <minInclusive value="-900"/>
    <maxInclusive value="900"/>
    </restriction>
</simpleType>
<simpleType name="beamHorizWidth">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="3599"/>
    </restriction>
</simpleType>
<simpleType name="beamVertWidth">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="1800"/>
    </restriction>
</simpleType>
<simpleType name="coverageShapeType">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="65535"/>
    </restriction>
</simpleType>
<simpleType name="resourceType">
    <restriction base="string">
    <enumeration value="PRB"/>
    <enumeration value="RRC"/>
    <enumeration value="DRB"/>
    </restriction>
</simpleType>
<complexType name="LocalEndPoint">
    <sequence>
    <element name="ipv4Address" type="string"/>
    <element name="ipv6Address" type="string"/>
    <element name="ipv6Prefix" type="string"/>
    <element name="vlanId" type="integer"/>
    </sequence>
</complexType>
<complexType name="RemoteEndPoint">
    <sequence>
    <element name="ipv4Address" type="string"/>
    <element name="ipv6Address" type="string"/>
    <element name="ipv6Prefix" type="string"/>
    </sequence>
</complexType>
<complexType name="blackListEntry">
    <sequence minOccurs="0" maxOccurs="1007">
    <element name="pci" type="en:Pci" maxOccurs="504"/>
    </sequence>
</complexType>
<complexType name="blackListEntryIdleMode">
    <sequence minOccurs="0" maxOccurs="1007">
    <element name="pci" type="en:Pci" maxOccurs="504"/>
```

```
    </sequence>
</complexType>
<complexType name="PLMNIdList">
    <sequence>
    <element name="pLMNId" type="en:PLMNId" maxOccurs="6"/>
    <!-- The first pLMNId of the pLMNIdList is primary PLMN id -->
    </sequence>
</complexType>
<complexType name="cellIndividualOffset">
    <sequence>
    <element name="rsrpOffsetSSB" type="qOffsetRangeList"/>
    <element name="rsrqOffsetSSB" type="qOffsetRangeList"/>
    <element name="sinrOffsetSSB" type="qOffsetRangeList"/>
    <element name="rsrpOffsetCSI-RS" type="qOffsetRangeList"/>
    <element name="rsrqOffsetCSI-RS" type="qOffsetRangeList"/>
    <element name="sinrOffsetCSI-RS" type="qOffsetRangeList"/>
    </sequence>
  </complexType>
 <complexType name="PLMNInfoType">
    <sequence>
    <element name="pLMNId" type="en:PLMNId"/>
    <element name="sNSSAI" type="ngc:SNssai" minOccurs="0"/>
    </sequence>
</complexType>
 <complexType name="PLMNInfoListType">
    <sequence>
    <element name="pLMNInfo" type="PLMNInfoType" minOccurs="1"/>
    </sequence>
</complexType>
<simpleType name="maximumDeviationHoTrigger">
    <restriction base="integer">
    <minInclusive value="-20"/>
    <maxInclusive value="20"/>
    </restriction>
</simpleType>
<simpleType name="minimumTimeBetweenHoTriggerChange">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="604800"/>
    </restriction>
</simpleType>
<simpleType name="tstoreUEcntxt">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="1023"/>
    </restriction>
</simpleType>
<simpleType name="loadThreshold">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="100"/>
    </restriction>
</simpleType>
<simpleType name="timeDuration">
    <restriction base="integer">
    <minInclusive value="0"/>
    <maxInclusive value="900"/>
    </restriction>
</simpleType>
<simpleType name="energySavingControl">
    <restriction base="string">
    <enumeration value="toBeEnergySaving"/>
    <enumeration value="toBeNotEnergySaving"/>
    </restriction>
</simpleType>
<simpleType name="energySavingState">
    <restriction base="string">
    <enumeration value="isNotEnergySaving"/>
    <enumeration value="isEnergySaving"/>
    </restriction>
</simpleType>
<simpleType name="isProbingCapable">
    <restriction base="string">
    <enumeration value="yes"/>
    <enumeration value="no"/>
    </restriction>
</simpleType>
<simpleType name="AccessDelayRange">
```

```
  <restriction base="unsignedShort">
    <minInclusive value="10"/>
    <maxInclusive value="560"/>
  </restriction>
</simpleType>
<simpleType name="NumberOfPreambleRange">
  <restriction base="unsignedShort">
    <minInclusive value="1"/>
    <maxInclusive value="200"/>
  </restriction>
</simpleType>
<simpleType name="RachProbability">
  <restriction base="unsignedShort">
    <enumeration value="25"/>
    <enumeration value="50"/>
    <enumeration value="75"/>
    <enumeration value="90"/>
  </restriction>
</simpleType>
<complexType name="UeAccDelayProbilityDistPerSSB">
  <sequence>
    <element name="Probability" type="sp:RachProbability"/>
    <element name="AccessDelay" type="sp:AccessDelayRange"/>
  </sequence>
</complexType>
<complexType name="UeAccDelayProbilityDistPerSSBlist">
  <sequence>
    <element name="ueAccDelayProbilityDistPerSSB" type="sp:UeAccDelayProbilityDistPerSSB"
maxOccurs="4"/>
  </sequence>
</complexType>
<complexType name="UeAccProbilityDistPerSSB">
  <sequence>
    <element name="Probability" type="sp:RachProbability"/>
    <element name="NumberOfPreamble" type="sp:NumberOfPreambleRange"/>
  </sequence>
</complexType>
<complexType name="UeAccProbilityDistPerSSBlist">
  <sequence>
    <element name="ueAccProbilityDistPerSSB" type="sp:UeAccProbilityDistPerSSB" maxOccurs="4"/>
  </sequence>
</complexType>
<simpleType name="NRPci">
  <restriction base="unsignedShort">
    <maxInclusive value="1007"/>
  </restriction>
</simpleType>
<complexType name="NRPciList">
  <sequence>
      <element name="nRPci" type="en:NRPci" maxOccurs="1008"/>
  </sequence>
</complexType>
<simpleType name="NRPci">
  <restriction base="unsignedShort">
    <maxInclusive value="1007"/>
  </restriction>
</simpleType>
<complexType name="CSonPciList">
  <sequence>
      <element name="nRPci" type="en:NRPci" maxOccurs="1008"/>
  </sequence>
</complexType>
<element name="GNBDUFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <!-- Inherited attributes from ManagedFunction -->
                    <element name="userLabel" type="string" minOccurs="0"/>
                    <element name="vnfParametersList" type="xn:vnfParametersListType"
minOccurs="0"/>
                    <element name="peeParametersList" type="xn:peeParametersListType"
minOccurs="0"/>
                    <element name="priority" type="integer" minOccurs="0"/>
```

```
                    <element name="measurements" type="xn:MeasurementTypesAndGPsList"
minOccurs="0"/>
                    <!--End of inherited attributes from ManagedFunction-->
                    <element name="gnbId" type="nn:GnbId"/>
                    <element name="gnbIdLength" type="nn:GnbIdLength"/>
                    <element name="gnbDUId" type="nn:GnbDuId"/>
                    <element name="gnbDuName" type="nn:GnbName" minOccurs="0"/>
                    <element name="x2Blacklist" type="string" minOccurs="0"/>
                    <element name="x2Whitelist" type="string" minOccurs="0"/>
                    <element name="xnBlacklist" type="string" minOccurs="0"/>
                    <element name="xnWhitelist" type="string" minOccurs="0"/>
                    <element name="xnHOBlackList" type="string" minOccurs="0"/>
                    <element name="x2HOBlackList" type="string" minOccurs="0"/>
                    <element name="aggressorSetID" type="nn:AggressorSetID"/>
                    <element name="victimSetID" type="nn:VictimSetID"/>
                </all>
                </complexType>
                </element>
                <choice minOccurs="0" maxOccurs="unbounded">
                    <element ref="nn:NRCellDU"/>
                    <element ref="nn:BWP"/>
                    <element ref="nn:NRSectorCarrier"/>
                    <element ref="nn:EP_F1C"/>
                    <element ref="nn:EP_F1U"/>
                </choice>
                <choice minOccurs="0" maxOccurs="unbounded">
                <element ref="xn:MeasurementControl"/>
                </choice>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="GNBCUCPFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <!-- Inherited attributes from ManagedFunction -->
                    <element name="userLabel" type="string" minOccurs="0"/>
                    <element name="vnfParametersList" type="xn:vnfParametersListType"
minOccurs="0"/>
                    <element name="peeParametersList" type="xn:peeParametersListType"
minOccurs="0"/>
                    <element name="priority" type="integer" minOccurs="0"/>
                    <element name="measurements" type="xn:MeasurementTypesAndGPsList"
minOccurs="0"/>
                    <!--End of inherited attributes from ManagedFunction-->
                    <element name="gnbId" type="nn:GnbId" />
                    <element name="gnbIdLength" type="nn:GnbIdLength"/>
                    <element name="gnbCuName" type=" nn:GnbName" minOccurs="0"/>
                    <element name="pLMNId" type="en:PLMNId" />
                    <element name="x2Blacklist" type="string" minOccurs="0"/>
                    <element name="x2Whitelist" type="string" minOccurs="0"/>
                    <element name="xnBlacklist" type="string" minOccurs="0"/>
                    <element name="xnWhitelist" type="string" minOccurs="0"/>
                    <element name="xnHOBlackList" type="string" minOccurs="0"/>
                    <element name="x2HOBlackList" type="string" minOccurs="0"/>
                    <element name="mappingSetIDBackhaulAddress" type="MappingSetIDBackhaulAddress"
minOccurs="0"/>
                    <element name="configurable5QISetRef" type="xn:dn"/>
                </all>
                </complexType>
                </element>
                <choice minOccurs="0" maxOccurs="unbounded">
                    <element ref="nn:NRCellCU"/>
                    <element ref="nn:EP_F1C"/>
                    <element ref="nn:EP_E1"/>
                    <element ref="nn:EP_XnC"/>
                    <element ref="nn:EP_X2C"/>
                    <element ref="nn:EP_NgC"/>
                    <element ref="xn:VsDataContainer"/>
                </choice>
                <choice minOccurs="0" maxOccurs="unbounded">
                    <element ref="DESManagementFunction"/>
```

```
                    <element ref="DRACHOptimizationFunction"/>
                    <element ref="DMROFunction"/>
                    <element ref="DANRManagementFunction"/>
                </choice>
                <choice minOccurs="0" maxOccurs="unbounded">
                    <element ref="xn:MeasurementControl"/>
                </choice>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="GNBCUUPFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <!-- Inherited attributes from ManagedFunction -->
                    <element name="userLabel" type="string" minOccurs="0"/>
                    <element name="vnfParametersList" type="xn:vnfParametersListType"
minOccurs="0"/>
                    <element name="peeParametersList" type="xn:peeParametersListType"
minOccurs="0"/>
                    <element name="priority" type="integer" minOccurs="0"/>
                    <element name="measurements" type="xn:MeasurementTypesAndGPsList"
minOccurs="0"/>
                    <!--End of inherited attributes from ManagedFunction-->
                    <element name="gNBCUUPId" type="nn:GnbCuupId "/>
                    <element name="pLMNInfoList" type="PLMNInfoListType"/>
                    <element name="gNBId" type="nn:GnbId"/>
                    <element name="gnbIdLength" type="nn:GnbIdLength"/>
                    <element name="configurable5QISetRef" type="xn:dn"/>
                </all>
                </complexType>
                </element>
                <choice minOccurs="0" maxOccurs="unbounded">
                    <element ref="nn:EP_E1"/>
                    <element ref="nn:EP_F1U"/>
                    <element ref="nn:EP_XnU"/>
                    <element ref="nn:EP_NgU"/>
                    <element ref="nn:EP_X2U"/>
                    <element ref="nn:EP_S1U"/>
                    <element ref="xn:VsDataContainer"/>
                </choice>
                <choice minOccurs="0" maxOccurs="unbounded">
                    <element ref="xn:MeasurementControl"/>
                </choice>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="NRCellCU">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <!-- Inherited attributes from ManagedFunction -->
                    <element name="userLabel" type="string" minOccurs="0"/>
                    <element name="vnfParametersList" type="xn:vnfParametersListType"
minOccurs="0"/>
                    <element name="peeParametersList" type="xn:peeParametersListType"
minOccurs="0"/>
                    <element name="priority" type="integer" minOccurs="0"/>
                    <element name="measurements" type="xn:MeasurementTypesAndGPsList"
minOccurs="0"/>
                    <!--End of inherited attributes from ManagedFunction-->
                    <element name="nCGI" type="nn:Ncgi"/>
                    <element name="pLMNIdList" type="en:PLMNIdList"/>
                    <element name="sNSSAIList" type="ngc:SnssaiList" minOccurs="0"/>
                    <element name="nRFrequencyRef" type="xn:dn" minOccurs="0"/>
                </all>
```

```
                </complexType>
                </element>
                <choice minOccurs="0" maxOccurs="unbounded">
                    <element ref="xn:VsDataContainer"/>
                    <element ref="nRCellRelation"/>
                    <element ref="nRFreqRelation"/>
                    <element ref="eUtranCellRelation"/>
                    <element ref="eUtranFreqRelation"/>
                </choice>
                <choice minOccurs="0" maxOccurs="unbounded">
                    <element ref="xn:MeasurementControl"/>
                </choice>
                <choice minOccurs="0" maxOccurs="1">
                    <element ref="sp:EnergySavingProperties"/>
                    <element ref="sp:ESPolicies"/>
                </choice>
                <choice minOccurs="0" maxOccurs="unbounded">
                    <element ref= "RRMPolicyRatio"/>
                </choice>
                <choice minOccurs="0" maxOccurs="unbounded">
                    <element ref="DESManagementFunction"/>
                    <element ref="DRACHOptimizationFunction"/>
                    <element ref="DMROFunction"/>
                    <element ref="CESManagementFunction"/>
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minOccurs="0"/>
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minOccurs="0"/>
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minOccurs="0"/>
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                <complexType>
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                    <!-- Inherited attributes from ManagedFunction -->
                    <element name="userLabel" type="string" minOccurs="0"/>
                    <element name="vnfParametersList" type="xn:vnfParametersListType"
minOccurs="0"/>
                    <element name="peeParametersList" type="xn:peeParametersListType"
minOccurs="0"/>
                    <element name="priority" type="integer" minOccurs="0"/>
                    <element name="measurements" type="xn:MeasurementTypesAndGPsList"
minOccurs="0"/>
                    <!--End of inherited attributes from ManagedFunction -->
                    <element name="absoluteFrequencySSB" type="nn:Absolutefrequencyssb"
minOccurs="0"/>
                    <element name="sSBSubCarrierSpacing" type="nn:Ssbsubcarrierspacing"
minOccurs="0"/>
                    <element name="multiFrequencyBandListNR" type="nn:MultifrequencyBandlistnr"
minOccurs="0"/>
                </all>
                </complexType>
                </element>
                <choice minOccurs="0" maxOccurs="unbounded">
                    <element ref="xn:VsDataContainer"/>
                </choice>
                <choice minOccurs="0" maxOccurs="1">
                <element ref="sp:EnergySavingProperties"/>
                <element ref="sp:ESPolicies"/>
                </choice>
                <choice minOccurs="0" maxOccurs="unbounded">
                    <element ref="xn:MeasurementControl"/>
                </choice>
            </sequence>
        </extension>
        </complexContent>
    </complexType>
</element>
<element name="MappingSetIDBackhaulAddress">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="setID" type="nn:SetId" />
                    <element name="backhaulAdress" type="BackhaulAddress" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="BackhaulAddress">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="gNBID" type="nn:GnbId" />
                    <element name="tAI" type="TAI" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="TAI">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
```

```
                <complexType>
                <all>
                    <element name="nRTac" type="nn:NrTac" />
                    <element name="pLMNId" type="en:PLMNId" />
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="DANRManagementFunction">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="intrasystemANRManagementSwitch" type="boolean" minOccurs="0"/>
                    <element name="intrasystemANRManagementSwitch" type="beamType" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>

<element name="DESManagementFunction">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="desSwitch" type="boolean" minOccurs="0"/>
                    <element name="intraRatEsActivationOriginalCellLoadParameters"
type="IntraRatEsActivationOriginalCellLoadParameters " minOccurs="0"/>
                    <element name="intraRatEsActivationCandidateCellsLoadParameters"
type="IntraRatEsActivationCandidateCellsLoadParameters" minOccurs="0"/>
                    <element name="intraRatEsDeactivationCandidateCellsLoadParameters"
type="IntraRatEsDeactivationCandidateCellsLoadParameters" minOccurs="0"/>
                    <element name="esNotAllowedTimePeriod" type="EsNotAllowedTimePeriod"
minOccurs="0"/>
                    <element name="interRatEsActivationOriginalCellParameters"
type="InterRatEsActivationOriginalCellParameters" minOccurs="0"/>
                    <element name="interRatEsActivationCandidateCellParameters"
type="InterRatEsActivationCandidateCellParameters" minOccurs="0"/>
                    <element name="interRatEsDeactivationCandidateCellParameters"
type="InterRatEsDeactivationCandidateCellParameters" minOccurs="0"/>
                    <element name="energySavingState" type="energySavingState" minOccurs="0"/>
                    <element name="isProbingCapable" type="isProbingCapable" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="IntraRatEsActivationOriginalCellLoadParameters">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="loadThreshold" type="loadThreshold" minOccurs="0"/>
                    <element name="timeDuration" type="timeDuration" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
```

```
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="IntraRatEsActivationCandidateCellsLoadParameters">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="loadThreshold" type="loadThreshold" minOccurs="0"/>
                    <element name="timeDuration" type="timeDuration" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="IntraRatEsDeactivationCandidateCellsLoadParameters">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="loadThreshold" type="loadThreshold" minOccurs="0"/>
                    <element name="timeDuration" type="timeDuration" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>

<element name="EsNotAllowedTimePeriod">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="startTimeandendTime" type="nn:startTimeandendTime" />
                    <element name="periodOfDay" type="nn:startTimeandendTime" />
                    <element name="daysOfWeekList" type="en:daysOfWeekList" />
                    <element name="listoftimeperiods" type="en:listoftimeperiods" />
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="InterRatEsActivationOriginalCellParameters">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="loadThreshold" type="loadThreshold" minOccurs="0"/>
                    <element name="timeDuration" type="timeDuration" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
```

```
</element>
<element name="InterRatEsActivationCandidateCellParameters">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="loadThreshold" type="loadThreshold" minOccurs="0"/>
                    <element name="timeDuration" type="timeDuration" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="InterRatEsDeactivationCandidateCellParameters">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="loadThreshold" type="loadThreshold" minOccurs="0"/>
                    <element name="timeDuration" type="timeDuration" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>

<element name="DRACHOptimizationFunction">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="ueAccProbilityDistPerSSBlist" type="UeAccProbilityDistPerSSBlist"
minOccurs="0"/>
                    <element name="ueAccDelayProbilityDistPerSSBlist"
type="UeAccDelayProbilityDistPerSSBlist" minOccurs="0"/>
                    <element name="drachOptimizationControl" type="boolean" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="DMROFunction">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="dmroControl" type=" boolean" minOccurs="0"/>
                    <element name="maximumDeviationHoTrigger" type="maximumDeviationHoTrigger"
minOccurs="0"/>
                    <element name="minimumTimeBetweenHoTriggerChange"
type="minimumTimeBetweenHoTriggerChange" minOccurs="0"/>
                    <element name="tstoreUEcntxt" type="tstoreUEcntxt" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
```

```
        </complexContent>
    </complexType>
</element>
<element name="DPCIConfigurationFunction">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="nRPciList" type="NRPciList" minOccurs="0"/>
                    <element name="dPciConfigurationControl" type="boolean" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="CPCIConfigurationFunction">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="cSonPciList" type="CSonPciList" minOccurs="0"/>
                    <element name="cPciConfigurationControl" type="boolean" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
<element name="CESManagementFunction">
    <complexType>
        <complexContent>
            <extension base="xn:NrmClass">
            <sequence>
                <element name="attributes">
                <complexType>
                <all>
                    <element name="cesSwitch" type="boolean" minOccurs="0"/>
                    <element name="energySavingState" type="energySavingState" minOccurs="0"/>
                    <element name="energySavingControl" type="energySavingControl" minOccurs="0"/>
                </all>
                </complexType>
                </element>
            </sequence>
            </extension>
        </complexContent>
    </complexType>
</element>
</schema>
```

Annex D (normative): OpenAPI definition of the NR NRM

D.1 General

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

The Information Service (IS) of the NR NRM is defined in clause 4.

Mapping rules to produce the OpenAPI definition based on the IS are defined in 3GPP TS 32.160 [14].

D.2 Void

D.3 Void

D.4 Solution Set (SS) definitions

D.4.1 Void

D.4.2 Void

D.4.3 OpenAPI document "nrNrm.yaml"

```
openapi: 3.0.1
info:
  title: NR NRM
  version: 16.5.0
  description: >-
    OAS 3.0.1 specification of the NR NRM
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 28.541 V16.5.0; 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
    SnssaiList:
      type: array
      items:
        $ref: '#/components/schemas/Snssai'

    Mnc:
      type: string
      pattern: '[0-9]{3}|[0-9]{2}'
    PlmnId:
      type: object
      properties:
        mcc:
          $ref: 'genericNrm.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'

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

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

    NrPci:
      type: integer
      maximum: 503
    NrTac:
      type: integer
      maximum: 16777215
    Tai:
      type: object
      properties:
        plmnId:
          $ref: '#/components/schemas/PlmnId'
        nrTac:
          $ref: '#/components/schemas/NrTac'

    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

  UeAccProbilityDistPerSSB:
    type: object
    properties:
      targetProbability:
        type: integer
      numberofpreamblessent:
        type: integer

  UeAccDelayProbilityDistPerSSB:
    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

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
QuotaType:
  type: string
  enum:
    - STRICT
    - FLOAT
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'

LocalAddress:
```

```
      type: object
      properties:
        ipv4Address:
          $ref: 'genericNrm.yaml#/components/schemas/Ipv4Addr'
        ipv6Address:
          $ref: 'genericNrm.yaml#/components/schemas/Ipv6Addr'
        vlanId:
          type: integer
          minimum: 0
          maximum: 4096
        port:
          type: integer
          minimum: 0
          maximum: 65535
    RemoteAddress:
      type: object
      properties:
        ipv4Address:
          $ref: 'genericNrm.yaml#/components/schemas/Ipv4Addr'
        ipv6Address:
          $ref: 'genericNrm.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'

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

    RrmPolicy_-Attr:
      type: object
      properties:
        resourceType:
          type: string
        rRMPolicyMemberList:
          $ref: '#/components/schemas/RrmPolicyMemberList'


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

    SubNetwork-Single:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              $ref: 'genericNrm.yaml#/components/schemas/SubNetwork-Attr'
        - $ref: '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'
          DPCIConfigurationFunction:
            $ref: '#/components/schemas/DPCIConfigurationFunction-Single'
          CPCIConfigurationFunction:
            $ref: '#/components/schemas/CPCIConfigurationFunction-Single'
          CESManagementFunction:
            $ref: '#/components/schemas/CESManagementFunction-Single'
          Configurable5QISet:
            $ref: '5gcNrm.yaml#/components/schemas/Configurable5QISet-Multiple'
          RimRSGlobal:
            $ref: '#/components/schemas/RimRSGlobal-Single'
    ManagedElement-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              $ref: 'genericNRM.yaml#/components/schemas/ManagedElement-Attr'
        - $ref: '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'
            DPCIConfigurationFunction:
              $ref: '#/components/schemas/DPCIConfigurationFunction-Single'
            CPCIConfigurationFunction:
              $ref: '#/components/schemas/CPCIConfigurationFunction-Single'
            CESManagementFunction:
              $ref: '#/components/schemas/CESManagementFunction-Single'
            Configurable5QISet:
              $ref: '5gcNrm.yaml#/components/schemas/Configurable5QISet-Multiple'

    GnbDuFunction-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: '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'
        - $ref: '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'
GnbCuUpFunction-Single:
  allOf:
    - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: '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: 'genericNRM.yaml#/components/schemas/Dn'
    - $ref: '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: 'genericNRM.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: '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 '
                xnHOBlackList:
                  $ref: '#/components/schemas/GGnbIdList '
                x2HOBlackList:
                  $ref: '#/components/schemas/GEnbIdList'
                mappingSetIDBackhaulAddress:
                  $ref: '#/components/schemas/MappingSetIDBackhaulAddress'
                configurable5QISetRef:
                  $ref: 'genericNRM.yaml#/components/schemas/Dn'
    - $ref: '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'
        DRACHOptimizationFunction:
          $ref: '#/components/schemas/DRACHOptimizationFunction-Single'
        DMROFunction:
          $ref: '#/components/schemas/DMROFunction-Single'

  NrCellCu-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-Attr'
              - type: object
                properties:
                  cellLocalId:
                    type: integer
                  plmnInfoList:
                    $ref: '#/components/schemas/PlmnInfoList'
                  nRFrequencyRef:
                    $ref: 'genericNRM.yaml#/components/schemas/Dn'
      - $ref: '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'
          DRACHOptimizationFunction:
            $ref: '#/components/schemas/DRACHOptimizationFunction-Single'
          DMROFunction:
            $ref: '#/components/schemas/DMROFunction-Single'
          CESManagementFunction:
            $ref: '#/components/schemas/CESManagementFunction-Single'

  NrCellDu-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-Attr'
              - type: object
                properties:
                  administrativeState:
                    $ref: 'genericNRM.yaml#/components/schemas/AdministrativeState'
                  operationalState:
                    $ref: 'genericNRM.yaml#/components/schemas/OperationalState'
                  cellLocalId:
                    type: integer
```

```
                cellState:
                  $ref: '#/components/schemas/CellState'
                plmnInfoList:
                  $ref: '#/components/schemas/PlmnInfoList'
                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: 'genericNRM.yaml#/components/schemas/Dn'
                bwpRef:
                  type: array
                  items:
                    $ref: 'genericNRM.yaml#/components/schemas/Dn'
                nRFrequencyRef:
                  $ref: 'genericNRM.yaml#/components/schemas/Dn'
                victimSetRef:
                  $ref: 'genericNRM.yaml#/components/schemas/Dn'
                aggressorSetRef:
                  $ref: 'genericNRM.yaml#/components/schemas/Dn'
    - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        RRMPolicyRatio:
          $ref: '#/components/schemas/RRMPolicyRatio-Multiple'
        DPCIConfigurationFunction:
          $ref: '#/components/schemas/DPCIConfigurationFunction-Single'
        CPCIConfigurationFunction:
          $ref: '#/components/schemas/CPCIConfigurationFunction-Single'

  NRFrequency-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-Attr'
              - type: object
                properties:
                  absoluteFrequencySSB:
                    type: integer
                    minimum: 0
                    maximum: 3279165
                  ssbSubCarrierSpacing:
                    $ref: '#/components/schemas/SsbSubCarrierSpacing'
                  multiFrequencyBandListNR:
                    type: integer
                    minimum: 1
                    maximum: 256
```

```
    - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-ncO'
  EUtranFrequency-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
            $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-Attr'
      - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-ncO'

  NrSectorCarrier-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: '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: 'genericNRM.yaml#/components/schemas/Dn'
      - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-ncO'
      - type: object
        properties:
          CommonBeamformingFunction:
            $ref: '#/components/schemas/CommonBeamformingFunction-Single'
  Bwp-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: '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: 'genericNRM.yaml#/components/schemas/ManagedFunction-ncO'
  CommonBeamformingFunction-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - 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: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - 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: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - 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: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
                type: object
                properties:
                  nRTCI:
                    type: integer
                  cellIndividualOffset:
                    $ref: '#/components/schemas/CellIndividualOffset'
                  adjacentNRCellRef:
                    $ref: 'genericNRM.yaml#/components/schemas/Dn'
                  nRFrequencyRef:
                    $ref: 'genericNRM.yaml#/components/schemas/Dn'
                  isRemoveAllowed:
                    type: boolean
                  isHOAllowed:
                    type: boolean
                  isESCoveredBy:
                    $ref: '#/components/schemas/IsESCoveredBy'
                  isENDCAllowed:
                    type: boolean
  EUtranCellRelation-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
```

```
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-Attr'
              - type: object
                properties:
                  adjacentEUtranCellRef:
                    $ref: 'genericNRM.yaml#/components/schemas/Dn'
      - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-ncO'
    NRFreqRelation-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
                  type: object
                  properties:
                    offsetMO:
                      $ref: '#/components/schemas/QOffsetRangeList'
                    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
                    tReselectionNr:
                      type: integer
                      minimum: 0
                      maximum: 7
                    tReselectionNRSfHigh:
                      $ref: '#/components/schemas/TReselectionNRSf'
                    tReselectionNRSfMedium:
                      $ref: '#/components/schemas/TReselectionNRSf'
                    nRFrequencyRef:
                      $ref: 'genericNRM.yaml#/components/schemas/Dn'
    EUtranFreqRelation-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
```

```
          attributes:
            allOf:
              - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-Attr'
              - type: object
                properties:
                  eUTranFrequencyRef:
                    $ref: 'genericNRM.yaml#/components/schemas/Dn'
      - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-ncO'
    DANRManagementFunction-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
                  type: object
                  properties:
                    intrasystemANRManagementSwitch:
                      type: boolean
                    intersystemANRManagementSwitch:
                      type: boolean

    DESManagementFunction-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - 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/IntraRatEsActivationOriginalCellLoadParameters"
                    interRatEsActivationCandidateCellParameters:
                      $ref: "#/components/schemas/IntraRatEsActivationOriginalCellLoadParameters"
                    interRatEsDeactivationCandidateCellParameters:
                      $ref: "#/components/schemas/IntraRatEsActivationOriginalCellLoadParameters"
                    isProbingCapable:
                      type: string
                      enum:
                         - yes
                         - no
                    energySavingState:
                      type: string
                      enum:
                         - isNotEnergySaving
                         - isEnergySaving

    DRACHOptimizationFunction-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
                  type: object
                  properties:
                    drachOptimizationControl:
                      type: boolean
                    ueAccProbilityDistPerSSB:
                      $ref: "#/components/schemas/UeAccProbilityDistPerSSB"
                    ueAccDelayProbilityDistPerSSB:
                      $ref: "#/components/schemas/UeAccDelayProbilityDistPerSSB"
        - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-ncO'

    DMROFunction-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
```

```
        attributes:
              type: object
              properties:
                dmroControl:
                  type: boolean
                maximumDeviationHoTrigger:
                  $ref: '#/components/schemas/MaximumDeviationHoTrigger'
                minimumTimeBetweenHoTriggerChange:
                  $ref: '#/components/schemas/MinimumTimeBetweenHoTriggerChange'
                tstoreUEcntxt:
                  $ref: '#/components/schemas/TstoreUEcntxt'

  DPCIConfigurationFunction-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
              type: object
              properties:
                dPciConfigurationControl:
                  type: boolean
                nRPciList:
                  $ref: "#/components/schemas/NRPciList"

  CPCIConfigurationFunction-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
              type: object
              properties:
                cPciConfigurationControl:
                  type: boolean
                cSonPciList:
                  $ref: "#/components/schemas/CSonPciList"

  CESManagementFunction-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
              type: object
              properties:
                cesSwitch:
                  type: boolean
                energySavingControl:
                  type: string
                  enum:
                     - toBeEnergySaving
                     - toBeNotEnergySaving
                energySavingState:
                  type: string
                  enum:
                     - isNotEnergySaving
                     - isEnergySaving

  RimRSGlobal-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - 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: 'genericNRM.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          type: object
          properties:
            setId:
              $ref: '#/components/schemas/RSSetId'
            setType:
              $ref: '#/components/schemas/RSSetType'
            rimRSMonitoringStartTime:
              type: string
            rimRSMonitoringStopTime:
              type: string
            rimRSMonitoringWindowDuration:
              type: integer
            rimRSMonitoringWindowStartingOffset:
              type: integer
            rimRSMonitoringWindowPeriodicity:
              type: integer
            rimRSMonitoringOccasionInterval:
              type: integer
            rimRSMonitoringOccasionStartingOffset:
              type: integer
            nRCellDURefs:
              $ref: 'genericNRM.yaml#/components/schemas/DnList'

  ExternalGnbDuFunction-Single:
    allOf:
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-Attr'
              - type: object
                properties:
                  gnbId:
                    $ref: '#/components/schemas/GnbId'
                  gnbIdLength:
                    $ref: '#/components/schemas/GnbIdLength'
      - $ref: '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: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-Attr'
              - type: object
                properties:
                  gnbId:
                    $ref: '#/components/schemas/GnbId'
                  gnbIdLength:
                    $ref: '#/components/schemas/GnbIdLength'
      - $ref: '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: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
            allOf:
```

```
            - $ref: >-
                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: '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: 'genericNRM.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                cellLocalId:
                  type: integer
                nrPci:
                  $ref: '#/components/schemas/NrPci'
                plmnIdList:
                  $ref: '#/components/schemas/PlmnIdList'
                nRFrequencyRef:
                  $ref: 'genericNRM.yaml#/components/schemas/Dn'
    - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-ncO'
ExternalENBFunction-Single:
  allOf:
    - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                eNBId:
                  type: integer
    - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        ExternalEUTranCell:
          $ref: '#/components/schemas/ExternalEUTranCell-Multiple'
ExternalEUTranCell-Single:
  allOf:
    - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                EUtranFrequencyRef:
                  $ref: 'genericNRM.yaml#/components/schemas/Dn'
    - $ref: 'genericNRM.yaml#/components/schemas/ManagedFunction-ncO'

EP_XnC-Single:
  allOf:
    - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
```

```
            - $ref: '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: 'genericNRM.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: '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: 'genericNRM.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: '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: 'genericNRM.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: '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: 'genericNRM.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: '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: 'genericNRM.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: '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: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: '#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: '#/components/schemas/RemoteAddress'
    EP_NgU-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: '#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: '#/components/schemas/RemoteAddress'
    EP_X2U-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: '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: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: '#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: '#/components/schemas/RemoteAddress'

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

Annex E (normative): YANG definitions for NR NRM

E.1 General

This annex contains the YANG definitions for the NR and NG-RAN NRM, in accordance with NR and NG-RAN NRM information model definitions specified in clause 4.

E.2 Void

E.3 Void

E.4 Void

E.5 Modules

E.5.1 module _3gpp-nr-nrm-beam@2019-11-22.yang

```
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:CommonBea
mformingFunction" {

    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;
      }
    }
  }
}
```

E.5.1a module _3gpp-nr-nrm-bwp@2019-10-28.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";
  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 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "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 "5 | 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

```
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";
  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 2020-03-02 { reference S5-201191"; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  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" {

    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 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_NgC {
      description "Represents the local end point of the control plane
        interface (NG-C) between the gNB and NG-Core entity.";
      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" {

    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 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;
      }
    }

    list EP_NgU {
      description "Represents the local end point of the NG user plane
        (NG-U) interface between the gNB and the UPGW.";
      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" {

    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;
      }
    }
  }
}
```

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

```
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 2020-05-08 { reference S5-203316 ; }
```

```
  revision 2020-06-03 { reference "CR-0286"; }
  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 or Domain-Centralized SON Energy Saving
feature";
  }

  feature DANRManagementFunction {
    description "Classs representing D-SON function of ANR Management feature";
  }

  feature DRACHOptimizationFunction {
    description "Classs representing D-SON function of RACH optimization 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;3
      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.";
    }
  }

  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;
    }
  }
}
```

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-nr-nrm-common { prefix nrcommon3gpp; }

  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 2020-05-28 { reference "CR-0318"; }
  revision 2020-06-03 { reference "CR-0286"; }
  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 {
    description "Initial revision";
  }

  grouping TAIGrp {
    description "Tracking Area Identity";

    list pLMNId {
      key "mcc mnc";
      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";
      uses nrcommon3gpp: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).";
    }
  }

  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@2020-02-14.yang

```
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; }

  organization "3GPP SA5";
  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 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 {
    description "Initial revision.";
  }

  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"; }
      config false;
      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";
    }

    leaf aggressorSetID {
      type uint32 { range "0..4194304"; }
      config false;
      description "Indicates the associated aggressor gNB Set ID of the cell
        Valid when Remote Interference Management function is supported.";
      reference "3GPP TS 38.211 subclause 7.4.1.6";
    }
    leaf victimSetID {
      type uint32 { range "0..4194304"; }
      config false;
      description "Indicates the associated victim gNB Set ID of the cell
        Valid when Remote Interference Management function is supported.";
      reference "3GPP TS 38.211 subclause 7.4.1.6";
    }
  }

  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;
    }
  }
}
```

E.5.19 module _3gpp-nr-nrm-nrcellcu@2020-02-14.yang

```
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-nr-nrm-common { prefix nrcommon3gpp; }

  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 2020-05-08 { reference S5-203316 ; }
  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 or Domain-Centralized SON Energy Saving
feature";
  }

  feature DRACHOptimizationFunction {
    description "Classs representing D-SON function of RACH optimization feature";
  }

  feature DMROFunction {
    description "Classs representing D-SON function of MRO feature";
  }

  feature CESManagementFunction {
    description "Classs representing Cross Domain-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";
      min-elements 1;
      uses nrcommon3gpp: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;
    }
  }
}
```

E.5.20 module _3gpp-nr-nrm-nrcelldu@2020-02-14.yang

```
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-nr-nrm-common { prefix nrcommon3gpp; }


  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 2020-05-08 { reference S5-203316 ; }
  revision 2020-02-14 { reference S5-20XXXX ; }
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-09-03 {
    description "Initial revision";
  }

  feature DPCIConfigurationFunction {
    description "Classs representing Distributed SON or Domain-Centralized SON function of PCI
configuration feature";
  }

  feature CPCIConfigurationFunction {
    description "Classs representing Cross Domain-Centralized SON function of PCI configuration
feature";
  }

  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";
    min-elements 1;
    uses nrcommon3gpp:PLMNInfo;
  }


  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 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";
    mandatory false;
    type int32;
    units MHz;
  }

  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-list nRSectorCarrierRef {
      description "Reference to corresponding NRSectorCarrier instance.";
      min-elements 1;
      type types3gpp:DistinguishedName;
    }

    leaf-list bWPRef {
      description "Reference to corresponding BWP instance.";
      min-elements 0;
      type types3gpp:DistinguishedName;
    }

    leaf-list nRFrequencyRef {
      description "Reference to corresponding NRFrequency instance.";
      min-elements 0;
      type types3gpp:DistinguishedName;
        }
  }

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

    list NRCellDU {
      description "Represents the information of a cell known by DU.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses NRCellDUGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

E.5.21 module _3gpp-nr-nrm-nrcellrelation@2019-10-28.yang

```
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 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;
    }
  }
}
```

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-nrnetwork-rrmpolicy";
  prefix "nrrrmpolicy3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  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 2020-04-28 {
    reference "CR0285";
  }
 revision 2020-02-14 {
    description "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 types3gpp:PLMNId;
    leaf sNSSAI {
      type types3gpp:SNssai;
    }
  }

  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, see the
      inheritance in TS 28.541 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.";
    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', 'RRC' or 'DRB'";
      mandatory true;
      type string;
    }

    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 "idx";
      leaf idx { type uint32; }
```

```
      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 module _3gpp-nr-nrm-common@2020-02-14.yang

```
module _3gpp-nr-nrm-common {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:3gpp-nr-nrm-common";
  prefix "nrcommon3gpp";

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

  organization "3GPP SA5";
  description "Defines the YANG mapping of comon parts for 3GPP TS 28.541.";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

 revision 2020-02-14 {
    description "Initial revision";
  }
```

```
  grouping PLMNInfo {
    description "The PLMNInfo data type define a S-NSSAI member in a specific PLMNId, and it have
      two attributes PLMNId and S-NSSAI (PLMNId, S-NSSAI). The PLMNId represents a data type that
      is comprised of mcc (mobile country code) and mnc (mobile network code), (See TS 23.003
      subclause 2.2 and 12.1) and S-NSSAI represents an data type, that is comprised of an SST
      (Slice/Service type) and an optional SD (Slice Differentiator) field, (See TS 23.003 [13]).";
    uses types3gpp:PLMNId;
    leaf sNssai {
      type types3gpp:SNssai;
    }
  }

}
```

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 "desmanagementfunction3gpp";


  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; }


  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 2020-05-08 { reference S5-203316; }


  grouping DESManagementFunctionGrp {
    description "Represents the DESManagementFunction IOC.";
    reference "3GPP TS 28.541";
    uses top3gpp:Top_Grp;

    leaf desSwitch {
        description "This attribute determines whether the Distributed SON or Domain-Centralized SON
energy saving function is enabled or disabled.";
         type boolean;
    }

  list intraRatEsActivationOriginalCellLoadParameters {
    key loadThreshold;
      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.";
    leaf loadThreshold {type int32;}
    container attributes {
      uses IntraRatEsActivationOriginalCellLoadParametersGrp;
     }
    }


  list intraRatEsActivationCandidateCellsLoadParameters {
    key loadThreshold;
      description "This attribute indicates the traffic load threshold and the time duration, which
are used by distributed ES algorithms level to allow a n ‘original’ cell to enter the energySaving
state.";
    leaf loadThreshold {type int32;}
    container attributes {
        uses IntraRatEsActivationCandidateCellsLoadParametersGrp;
     }
    }

  list intraRatEsDeactivationCandidateCellsLoadParameters {
    key loadThreshold;
      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.";
    leaf loadThreshold {type int32;}
    container attributes {
        uses IntraRatEsDeactivationCandidateCellsLoadParametersGrp;
     }
    }

  list esNotAllowedTimePeriod {
    key startTimeandendTime;
      description "This attribute indicates a list of time periods during which inter-RAT energy
saving is not allowed.";
    leaf startTimeandendTime {type string;}
    container attributes {
        uses EsNotAllowedTimePeriodGrp;
     }
    }

  list interRatEsActivationOriginalCellParameters {
    key loadThreshold;
      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.";
    leaf loadThreshold {type int32;}
    container attributes {
        uses InterRatEsActivationOriginalCellParametersGrp;
```

```
     }
    }

  list interRatEsActivationCandidateCellParameters {
    key loadThreshold;
      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.";
    leaf loadThreshold {type int32;}
    container attributes {
        uses InterRatEsActivationCandidateCellParametersGrp;
     }
    }

  list interRatEsDeactivationCandidateCellParameters {
    key loadThreshold;
      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.";
    leaf loadThreshold {type int32;}
    container attributes {
        uses InterRatEsDeactivationCandidateCellParametersGrp;
     }
    }

    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 IntraRatEsActivationOriginalCellLoadParametersGrp {
    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 int32 { range "0..10000"; }
        units "1";
    }


    leaf timeDuration {
        description " The time duration indicates how long the load needs to have been below the
threshold.";
        type int32 { range "0..900"; }
        units "1";
    }
  }

  grouping IntraRatEsActivationCandidateCellsLoadParametersGrp {
    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 int32 { range "0..10000"; }
        units "1";
    }


    leaf timeDuration {
        description " The time duration indicates how long the load needs to have been below the
threshold.";
        type int32 { range "0..900"; }
```

```
        units "1";
    }
  }

  grouping IntraRatEsDeactivationCandidateCellsLoadParametersGrp {
    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 int32 { range "0..10000"; }
        units "1";
    }


    leaf timeDuration {
        description " The time duration indicates how long the load needs to have been below the
threshold.";
        type int32 { range "0..900"; }
        units "1";
    }
  }

  grouping EsNotAllowedTimePeriodGrp {
    description "Represents the the traffic load threshold and the time duration.";

    leaf startTimeandendTime {
        description "This field indicate valid UTC time.";
        type string;
    }


    leaf periodOfDay {
        description "This field indicate the period of day.";
        type string;
    }

    leaf daysOfWeekList {
        description "This field indicate the list of weekday.";
        type string;
    }

    leaf listoftimeperiods {
        description "This field indicate the list of time periods.";
        type string;
    }

  }

  grouping InterRatEsActivationOriginalCellParametersGrp {
    description "Represents the the traffic load threshold and the time duration.";

    leaf loadThreshold {
        description "The time duration indicates how long the traffic load (both for UL and DL)
needs to have been below the threshold.";
        type int32 { range "0..10000"; }
        units "1";
    }


    leaf timeDuration {
        description " The time duration indicates how long the load needs to have been below the
threshold.";
        type int32 { range "0..900"; }
        units "1";
    }
  }

  grouping InterRatEsActivationCandidateCellParametersGrp {
    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 int32 { range "0..10000"; }
        units "1";
    }
```

```
    leaf timeDuration {
        description "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.";
        type int32 { range "0..900"; }
        units "1";
    }
  }

  grouping InterRatEsDeactivationCandidateCellParametersGrp {
    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 int32 { range "0..10000"; }
        units "1";
    }


    leaf timeDuration {
        description "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.";
        type int32 { range "0..900"; }
        units "1";
    }
  }


  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/nrcellcu3gpp:NRCellCU" {
    if-feature nrcellcu3gpp:DESManagementFunction;
    uses DESManagementFunctionGrp;
    }
  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction" {
    if-feature gnbcucp3gpp:DESManagementFunction;
    uses DESManagementFunctionGrp;
    }
  augment "/me3gpp:ManagedElement" {
    if-feature me3gpp:DESManagementFunction;
    uses DESManagementFunctionGrp;
    }
  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:DESManagementFunction;
    uses DESManagementFunctionGrp;
    }

}
```

E.5.30 module _3gpp-nr-nrm-drachoptimizationfunction.yang

```
module _3gpp-nr-nrm-drachoptimizationfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-drachoptimizationfunction";
  prefix "drachoptimizationfunction3gpp";

  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 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 2020-05-08 { reference S5-203316; }


  grouping DRACHOptimizationFunctionGrp {
    description "Represents the DRACHOptimizationFunction IOC.";
    reference "3GPP TS 28.541";
    uses top3gpp:Top_Grp;
```

```
    list ueAccProbilityDistPerSSB {
      key targetProbability;
      description "This is a list of target Access Probability (APn) for the RACH optimization
function.";
      leaf targetProbability {type TargetProbability;}
      container attributes {
         uses UeAccProbilityDistPerSSBGrp;
     }
    }

    list ueAccDelayProbilityDistPerSSB {
      key targetProbability;
      description "This is a list of target Access Delay probability (ADP) for the RACH optimization
function.";
      leaf targetProbability {type TargetProbability;}
      container attributes {
         uses UeAccDelayProbilityDistPerSSBGrp;
     }
    }

    leaf drachOptimizationControl {
        description "This attribute determines whether the RACH Optimization function is enabled or
disabled.";
        type boolean;
    }
  }
  typedef TargetProbability {
    type enumeration  {
      enum 25;
      enum 50;
      enum 75;
      enum 90;
    }
  }

    typedef Numberofpreamblessent {
      type int32  { range "1..200"; }
        units "1";
  }

    typedef Accessdelay {
      type int32  { range "10..560"; }
        units "1";
  }


  grouping UeAccProbilityDistPerSSBGrp {
    description "Represents the target Access Probability (APn) for the RACH optimization
function.";

    leaf targetProbability {
        description "This attribute determines the target Probability.";
        mandatory true;
        type TargetProbability;
    }


    leaf numberofpreamblessent {
        description "This attribute determines the number of preambles sent.";
        mandatory true;
        type Numberofpreamblessent;
    }
  }

  grouping UeAccDelayProbilityDistPerSSBGrp {
    description "Represents the target Access Delay probability (ADP) for the RACH optimization
function.";

    leaf targetProbability {
        description "This attribute determines the target Probability.";
      mandatory true;
        type TargetProbability;
    }


    leaf accessdelay {
        description "This attribute determines the access delay.";
```

```
        mandatory true;
        type Accessdelay;
    }
  }

  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/nrcellcu3gpp:NRCellCU" {
    if-feature nrcellcu3gpp:DRACHOptimizationFunction;
    uses DRACHOptimizationFunctionGrp;
    }
  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction" {
    if-feature gnbcucp3gpp:DRACHOptimizationFunction;
    uses DRACHOptimizationFunctionGrp;
    }
  augment "/me3gpp:ManagedElement" {
    if-feature me3gpp:DRACHOptimizationFunction;
    uses DRACHOptimizationFunctionGrp;
    }
  augment "/subnet3gpp:SubNetwork" {
    if-feature nrcellcu3gpp:DRACHOptimizationFunction;
    uses DRACHOptimizationFunctionGrp;
    }
}
```

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 "dmrofunction3gpp";

  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 2020-05-08 { reference S5-203316; }


  grouping DMROFunctionGrp {
    description "Represents the DMROFunction IOC.";
    reference "3GPP TS 28.541";
    uses top3gpp:Top_Grp;

    leaf maximumDeviationHoTrigger {
        description "This parameter defines the maximum allowed absolute deviation of the Handover
Trigger, from the default point of operation.";
        type int32 { range "-20..20"; }
        units "0.5";
    }

    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";
    }

    leaf tstoreUEcntxt {
        description "The timer used for detection of too early HO, too late HO and HO to wrong
cell.";
        type int32 { range "0..1023"; }
        units "100";
    }


    leaf dmroControl {
        description " This attribute determines whether the MRO function is enabled or disabled.";
        type boolean;
```

```
    }

  }


  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/nrcellcu3gpp:NRCellCU" {
    if-feature nrcellcu3gpp:DMROFunction;
    uses DMROFunctionGrp;
    }
  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction" {
    if-feature gnbcucp3gpp:DMROFunction;
    uses DMROFunctionGrp;
    }
  augment "/me3gpp:ManagedElement" {
    if-feature me3gpp:DMROFunction;
    uses DMROFunctionGrp;
    }
  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:DMROFunction;
    uses DMROFunctionGrp;
    }
}
```

E.5.32 module _3gpp-nr-nrm-dpciconfigurationfunction.yang

```
module _3gpp-nr-nrm-dpciconfigurationfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-dpciconfigurationfunction";
  prefix "dpciconfigurationfunction3gpp";

  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 "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 2020-05-08 { reference S5-203316; }


  grouping DPCIConfigurationFunctionGrp {
    description "Represents the DPCICONFIGURATIONFunction IOC.";
    reference "3GPP TS 28.541";
    uses top3gpp:Top_Grp;


    list nRPciList {
      key NRPci;
      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 or domain Centralized SON PCI
configuration function is supported.";
      leaf NRPci {type int32;}
      container attributes {
         uses NRPciListGrp;
     }
    }


    leaf dPciConfigurationControl {
        description " This attribute determines whether the Distributed SON or Domain-Centralized
SON PCI configuration Function is enabled or disabled.";
        type boolean;
    }

  }

  grouping NRPciListGrp {
    description "Represents the NR PCI list for the PCI configuration function.";

    leaf NRPci {
        description "This attribute determines the NR PCI.";
        type int32 { range "0..1007"; }
```

```
        units "1";
    }
  }


  augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction/nrcelldu3gpp:NRCellDU" {
    if-feature nrcelldu3gpp:DPCIConfigurationFunction;
    uses DPCIConfigurationFunctionGrp;
    }
  augment "/me3gpp:ManagedElement" {
    if-feature me3gpp:DPCIConfigurationFunction;
    uses DPCIConfigurationFunctionGrp;
    }
  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:DPCIConfigurationFunction;
    uses DPCIConfigurationFunctionGrp;
    }
}
```

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 "cpciconfigurationfunction3gpp";

  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 "Defines the YANG mapping of the CPCIConfigurationFunction 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 CPCIConfigurationFunctionGrp {
    description "Represents the CPCICONFIGURATIONFunction IOC.";
    reference "3GPP TS 28.541";
    uses top3gpp:Top_Grp;


    list cSonPciList {
      key NRPci;
      description " This holds a list of physical cell identities that can be assigned to the pci
attribute by gNB. The assignment algorithm is not specified. This attribute shall be supported if
and only if the C-SON PCI configuration is supported.";
      leaf NRPci {type int32;}
      container attributes {
         uses CSonPciListGrp;
     }
    }


    leaf cPciConfigurationControl {
        description "This attribute determines whether the Cross Domain-Centralized SON PCI
configuration function is enabled or disabled.";
        type boolean;
    }

  }

  grouping CSonPciListGrp {
    description "Represents the C-SON PCI list for the PCI configuration function.";

    leaf NRPci {
        description "This attribute determines the NR PCI.";
        type int32 { range "0..1007"; }
        units "1";
    }
  }
```

```
  augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction/nrcelldu3gpp:NRCellDU" {
    if-feature nrcelldu3gpp:CPCIConfigurationFunction;
    uses CPCIConfigurationFunctionGrp;
    }
  augment "/me3gpp:ManagedElement" {
    if-feature me3gpp:CPCIConfigurationFunction;
    uses CPCIConfigurationFunctionGrp;
    }
  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:CPCIConfigurationFunction;
    uses CPCIConfigurationFunctionGrp;
    }
}
```

E.5.34 module _3gpp-nr-nrm-cesmanagementfunction.yang

```
module _3gpp-nr-nrm-cesmanagementfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-cesmanagementfunction";
  prefix "cesmanagementfunction3gpp";

  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; }


  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 2020-05-08 { reference S5-203316; }


  grouping CESManagementFunctionGrp {
    description "Represents the CESManagementFunction IOC.";
    reference "3GPP TS 28.541";
    uses top3gpp:Top_Grp;

    leaf cesSwitch {
        description "This attribute determines whether the Cross Domain-Centralized SON energy
saving function is enabled or disabled.";
         type boolean;
    }

    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;
        }
    }


  }

  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/nrcellcu3gpp:NRCellCU" {
    if-feature nrcellcu3gpp:CESManagementFunction;
    uses CESManagementFunctionGrp;
    }
```

```
  augment "/me3gpp:ManagedElement" {
    if-feature me3gpp:CESManagementFunction;
    uses CESManagementFunctionGrp;
    }
  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:CESManagementFunction;
    uses CESManagementFunctionGrp;
    }
}
```

E.6 Void

E.7 Mount information

At the mountpoint "children-of-SubNetwork" in the YANG module `_3gpp-common-subnetwork`, the following YANG modules may be mounted if the class `ManagedElement` and the underlying hierarchy is contained under a `SubNetwork`.

See [45] that describes the mechanism that adds the schema trees defined by a set of YANG modules onto a mount point defined in the schema tree in another YANG module.

```
_3gpp-common-ep-rp.yang
_3gpp-common-managed-element.yang
_3gpp-common-managed-function.yang
_3gpp-common-measurements.yang
_3gpp-common-subnetwork.yang
_3gpp-common-top.yang
_3gpp-common-yang-extensions.yang
_3gpp-common-yang-types.yang
_3gpp-nr-nrm-bwp.yang
_3gpp-nr-nrm-ep.yang
_3gpp-nr-nrm-eutrancellrelation.yang
_3gpp-nr-nrm-gnbcucpfunction.yang
_3gpp-nr-nrm-gnbcuupfunction.yang
_3gpp-nr-nrm-gnbdufunction.yang
_3gpp-nr-nrm-nrcellcu.yang
_3gpp-nr-nrm-nrcelldu.yang
_3gpp-nr-nrm-nrcellrelation.yang
_3gpp-nr-nrm-nrfreqrelation.yang
_3gpp-nr-nrm-nrfrequency.yang
_3gpp-nr-nrm-nrnetwork.yang
_3gpp-nr-nrm-nrsectorcarrier.yang
_3gpp-nr-nrm-beam.yang
_3gpp-nr-nrm-commonbeamformingfunction.yang
_3gpp-nr-nrm-rrmpolicy.yang
ietf-inet-types.yang
ietf-yang-types.yang
```

If the above files are mounted the yang files described in clause H.7 shall also be mounted.

Annex F (normative): XML definitions for 5GC NRM

F.1 General

This annex contains the XML definitions for the 5GC NRM specified in clause 5, in accordance with 5G NRM Information Model definitions specified in clause 4.

F.2 Architectural features

The overall architectural feature of 5GC NRM information model is specified in clause 4, this clause specifies features that are specific to the Schema definitions.

The XML definitions of the present document specify the schema for a configuration content, which can be included in a configuration file for Bulk configuration management operations.

F.3 Mapping

F.3.1 General mapping

An IOC maps to an XML element of the same name as the IOC's name in the Information Model. An IOC attribute maps to a sub-element of the corresponding IOC's XML element, and the name of this sub-element is the same as the attribute's name in the Information Model.

F.3.2 Information Object Class (IOC) mapping

The mapping is not present in the current version of the present document.

F.4 Solution Set definitions

F.4.1 XML definition structure

The overall description of the file format of configuration data XML files is provided by 3GPP TS 32.616 [33].

The present document defines the NRM-specific XML schema ngcNrm.xsd for the 5GC NRM Information Model defined in clause 4.

XML schema ngcNrm.xsd explicitly declares NRM-specific XML element types for the related NRM.

The definition of those NRM-specific XML element types complies with the generic mapping rules defined in 3GPP TS 32.616 [33].

F.4.2 Graphical representation

The graphical representation is not present in the current version of the present document.

F.4.3 XML schema "ngcNrm.xsd"

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<!--
  3GPP TS 28.541 5GC Network Resource Model
  XML schema definition
  ngcNrm.xsd
-->

<schema
  targetNamespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#ngcNrm"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified"
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:xn="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"
xmlns:nn="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#nrNrm"
xmlns:en="http://www.3gpp.org/ftp/specs/archive/28_series/28.659#eutranNrm"
xmlns:ngc="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#ngcNrm"
>

<import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"/>
<import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.659#eutranNrm"/>
<import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#nrNrm"/>

<!--NGC NRM IM class associated XML elements -->
  <complexType name="aMFIdentifier">
    <sequence>
      <element name="amfRegionId" type="ngc:AmfRegionId"/>
      <element name="amfSetId" type="ngc:AmfSetId"/>
      <element name="amfPointer" type="ngc:AmfPointer"/>
    </sequence>
  </complexType>
  <simpleType name="AmfRegionId">
    <restriction base="integer">
      <maxInclusive value="255"/>
      <!-- The AMF Region ID is 8-bitslength, defined in 23.003 -->
    </restriction>
  </simpleType>
  <simpleType name="AmfSetId">
    <restriction base="integer">
      <maxInclusive value="1023"/>
      <!-- The AMF Region ID is 10-bits length, defined in 23.003 -->
    </restriction>
  </simpleType>
  <simpleType name="AmfPointer">
    <restriction base="integer">
      <maxInclusive value="63"/>
      <!-- The AMF Pointer is 6-bits length, defined in 23.003 -->
    </restriction>
  </simpleType>   <complexType name="NrTACList">
    <sequence>
      <element name="tac" type="nn:NrTac" minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
  </complexType>
  <complexType name="managedNFProfile">
    <sequence>
      <element name="nfInstanceID" type="string"/>
      <element name="nfType" type="ngc:NfType"/>
      <element name="hostAddr" type="ngc:hostAddr"/>
      <element name="authzInfo" type="string" minOccurs="0"/>
      <element name="location" type="string" minOccurs="0"/>
      <element name="capacity" type="ngc:capacity" minOccurs="0"/>
      <element name="nfInfo" type="ngc:Nfinfo"/>
    </sequence>
  </complexType>

  <complexType name="hostAddr">
    <!-- Refer to definitions in TS 28.541-->
    <sequence>
      <choice minOccurs="0" maxOccurs="1">
        <element name="ipAddress" type="string"/>
        <element name="fqdn" type="string"/>
      </choice>
    </sequence>
  </complexType>

  <simpleType name="capacity">
    <!-- Refer to definitions in TS 28.541-->
    <restriction base="integer">
      <minInclusive value="0"/>
```

```
      <maxInclusive value="65535"/>
    </restriction>
  </simpleType>

  <complexType name="Nfinfo">
    <!-- Refer to definitions in TS 28.541-->
    <sequence>
      <choice minOccurs="0" maxOccurs="1">
        <element name="amfInfo" type="ngc:AmfInfo"/>
        <element name="udrInfo" type="ngc:UdrInfo"/>
        <element name="udmInfo" type="ngc:UdmInfo"/>
        <element name="ausfInfo" type="ngc:AusfInfo"/>
        <element name="upfInfo" type="ngc:UpfInfo"/>
      </choice>
    </sequence>
  </complexType>
  <complexType name="NFProfileList">
    <sequence>
      <element name="nfProfile" type="ngc:NfProfile"/>
    </sequence>
  </complexType>
  <complexType name="NfProfile">
    <sequence>
      <element name="nfInstanceID" type="string"/>
        <!-- nfInstanceID is uuid of NF instance -->
      <element name="nfType" type="ngc:NfType"/>

      <element name="sNssais" type="ngc: SnssaiList"/>
      <element name="fqdn" type="string"/>
      <element name="interPlmnFqdn" type="string"/>
      <element name="ipv4Addresses" type="string"/>
      <element name="ipv6Addresses" type="string"/>
      <element name="ipv6Prefixes" type="string"/>
      <element name="capacity" type="string"/>
      <element name="udrInfo" type="ngc:UdrInfo"/>
      <element name="amfInfo" type="ngc:AmfInfo"/>
      <element name="smfInfo" type="ngc:SmfInfo"/>
      <element name="upfInfo" type="ngc:UpfInfo"/>
      <element name="nfServices" type="ngc:NfServices"/>
      <element name="priority" type="integer" minOccurs="0"/>
      <element name="nFSrvGroupId" type="string"/>
      <element name="smfServingAreas" type="string"/>
      <element name="locality" type="string"/>
      <element name="authzInfo" type="string"/>
    </sequence>
  </complexType>
  <complexType name="NfServices">
    <sequence>
      <element name="serviceInstanceId" type="string"/>
      <element name="serviceName" type="string"/>
      <element name="version" type="string"/>
      <element name="schema" type="string"/>
      <element name="fqdn" type="string"/>
      <element name="interPlmnFqdn" type="string"/>
            <element name="ipEndPoints" type="ngc:IpEndpoints"/>
            <element name="apiPrefix" type="string"/>
      <element name="defaultNotificationSubscriptions" type="ngc:DefaultNotificationSubscriptions"/>
            <element name="allowedPlmns" type="nn:PLMNIdList"/>
            <element name="allowedNfTypes" type="ngc:NFTypeList"/>
      <element name="allowedNssais" type="ngc:Nssai"/>
            <element name="capacity" type="string"/>
            <element name="supportedFeatures" type="string"/>
    </sequence>
  </complexType>
  <simpleType name="NfType">
    <restriction base="string">
      <!-- NF name is defined in TS 23.501 -->
      <enumeration value="NRF"/>
      <enumeration value="UDM"/>
      <enumeration value="AMF"/>
      <enumeration value="SMF"/>
      <enumeration value="AUSF"/>
      <enumeration value="NEF"/>
      <enumeration value="PCF"/>
      <enumeration value="SMSF"/>
      <enumeration value="NSSF"/>
      <enumeration value="UDR"/>
      <enumeration value="LMF"/>
```

```
      <enumeration value="GMLC"/>
      <enumeration value="5GEIR"/>
      <enumeration value="SEPP"/>
      <enumeration value="UPF"/>
      <enumeration value="N3IWF"/>
      <enumeration value="AF"/>
      <enumeration value="UDSF"/>
      <enumeration value="DN"/>
    </restriction>
  </simpleType>
  <complexType name="NFTypeList">
    <sequence>
      <element name="NFType" type="ngc:NfType"/>
    </sequence>
  </complexType>
    <complexType name="LocalEndPoint">
      <sequence>
        <element name="ipv4Address" type="string"/>
        <element name="ipv6Address" type="string"/>
        <element name="ipv6Prefix" type="string"/>
        <element name="vlanId" type="integer"/>
        </sequence>
    </complexType>
    <complexType name="RemoteEndPoint">
      <sequence>
        <element name="ipv4Address" type="string"/>
        <element name="ipv6Address" type="string"/>
        <element name="ipv6Prefix" type="string"/>
      </sequence>
    </complexType>
  <complexType name="UdrInfo">
    <sequence>
      <element name="supiRange" type="ngc:SupiRange"/>
    </sequence>
  </complexType>
  <complexType name="SupiRange">
    <sequence>
      <element name="start" type="string"/>
      <element name="end" type="string"/>
      <element name="pattern" type="string"/>
    </sequence>
  </complexType>
  <complexType name="AmfInfo">
    <sequence>
      <element name="amfSetId" type="ngc:AmfSetId"/>
    </sequence>
  </complexType>
  <complexType name="SmfInfo">
    <sequence>
      <element name="dnn" type="string"/>
    </sequence>
  </complexType>
  <complexType name="UpfInfo">
    <sequence>
      <element name="snssaiUpfInfo" type="ngc:SnssaiUpfInfo"/>
    </sequence>
  </complexType>
  <complexType name="UdmInfo">
    <sequence>
      <element name="nFSrvGroupId" type="string"/>
    </sequence>
  </complexType>
  <complexType name="AusfInfo">
    <sequence>
      <element name="nFSrvGroupId" type="string"/>
    </sequence>
  </complexType>
  <complexType name="SnssaiUpfInfo">
    <sequence>
      <element name="sNssai" type="ngc:SNssai"/>
      <element name="dnnUpfInfoList" type="ngc:DnnUpfInfoList"/>
    </sequence>
  </complexType>
  <complexType name="DnnUpfInfoList">
    <sequence>
      <element name="dnn" type="string"/>
    </sequence>
  </complexType>
```

```
<complexType name="DefaultNotificationSubscription">
  <sequence>
    <element name="notificationType" type="ngc:NotificationType"/>
    <element name="callbackUri" type="string"/>
    <element name="n1MessageClass" type="string"/>
    <element name="n2InformationClass" type="string"/>
  </sequence>
</complexType>
<simpleType name="NotificationType">
  <restriction base="string">
    <enumeration value="N1_MESSAGES"/>
    <enumeration value="N2_INFORMATION"/>
    <enumeration value="LOCATION_NOTIFICATION"/>
  </restriction>
</simpleType>
<simpleType name="TransportProtocol">
  <restriction base="string">
    <enumeration value="TCP"/>
  </restriction>
</simpleType>
<simpleType name="NfStatus">
  <restriction base="string">
    <enumeration value="REGISTERED"/>
    <enumeration value="SUSPENDED"/>
  </restriction>
</simpleType>
<complexType name="NfRegistrationData">
  <sequence>
    <element name="heartBeatTimer" type="integer"/>
    <element name="nfProfile" type="ngc:NfProfile"/>
  </sequence>
</complexType>
<complexType name="CNSIIdList">
  <sequence>
    <element name="cNSIId" type="string"/>
      <!-- CNSI Id is defined in TS 29.531 -->
  </sequence>
</complexType>
<complexType name="SnssaiList">
  <sequence>
    <element name="sNssai" type="ngc:SNssai"/>
  </sequence>
</complexType>
<complexType name="SNssai">
  <sequence>
    <element name="sst" type="ngc:Sst" minOccurs="0"/>
    <element name="sd" type="ngc:Sd"/>
  </sequence>
</complexType>
<simpleType name="Sst">
  <restriction base="integer">
    <maxInclusive value="255"/>
    <!-- SST is 1-octets length and defined in TS 23.003 -->
  </restriction>
</simpleType>
<simpleType name="Sd">
  <restriction base="string">
  <pattern value="^[A-Fa-f0-9]{6}$"/>
    <!-- SST is 3-octets length and defined in TS 23.003 -->
  </restriction>
</simpleType>
<simpleType name="WeightFactor">
  <restriction base="integer">
  </restriction>
</simpleType>

<simpleType name="SEPPType">
  <restriction base="string">
    <enumeration value="CSEPP"/>
    <enumeration value="PSEPP"/>
  </restriction>
</simpleType>

<complexType name="SupportedFunc">
  <sequence>
    <element name="function" type="string"/>
    <element name="policy" type="string" minOccurs="0"/>
  </sequence>
```

```
</complexType>

<complexType name="SupportedFuncList">
  <sequence>
    <element name="supportedFunc" type="ngc:SupportedFunc"/>
  </sequence>
</complexType>

<simpleType name="CommModelType">
  <restriction base="string">
    <enumeration value="DIRECT_COMMUNICATION_WO_NRF"/>
    <enumeration value="DIRECT_COMMUNICATION_WITH_NRF"/>
    <enumeration value="INDIRECT_COMMUNICATION_WO_DEDICATED_DISCOVERY"/>
    <enumeration value="INDIRECT_COMMUNICATION_WITH_DEDICATED_DISCOVERY"/>
  </restriction>
</simpleType>

<complexType name="CommModel">
  <sequence>
    <element name="groupId" type="integer"/>
    <element name="commModelType" type="ngc:CommModelType"/>
    <element name="targetNFServiceList" type="xn:dnlist"/>
    <element name="commModelConfiguration" type="string"/>
  </sequence>
</complexType>

<complexType name="CommModelList">
  <sequence>
    <element name="commModel" type="ngc:CommModel"/>
  </sequence>
</complexType>

<complexType name="CapabilityList">
  <sequence>
    <element name="capability" type="string"/>
  </sequence>
</complexType>
<complexType name="FiveQIList">
  <sequence>
    <element name="FiveQI" type="integer"/>
  </sequence>
</complexType>

<complexType name="FiveQiDscpMapping">
  <sequence>
    <element name="fiveQIValues" type="ngc:FiveQIList"/>
    <element name="dscp" type="integer"/>
  </sequence>
</complexType>
<complexType name="FiveQiDscpMappingList">
  <sequence>
    <element name="FiveQiDscpMapping" type="ngc:5qiDscpMapping"/>
  </sequence>
</complexType>

<simpleType name="FiveQIResourceType">
  <restriction base="string">
    <enumeration value="GBR"/>
    <enumeration value="NonGBR"/>
  </restriction>
</simpleType>

<complexType name="PacketErrorRate">
  <sequence>
    <element name="scalar" type="integer"/>
    <element name="exponent" type="integer"/>
  </sequence>
</complexType>

<complexType name="FiveQICharacteristics">
  <sequence>
    <element name="fiveQIValue" type="integer"/>
    <element name="resourceType" type="ngc:5QIResourceType"/>
    <element name="priorityLevel" type="integer"/>
    <element name="packetDelayBudget" type="integer"/>
    <element name="packetErrorRate" type="ngc:PacketErrorRate "/>
    <element name="averagingWindow" type="integer"/>
    <element name="maximumDataBurstVolume" type="integer"/>
```

```
    </sequence>
  </complexType>

  <complexType name="FiveQIList">
    <sequence>
      <element name="FiveQI" type="ngc:FiveQICharacteristics"/>
    </sequence>
  </complexType>

  <simpleType name="GtpUPathQoSMonitoringStateType">
    <restriction base="string">
      <enumeration value="ENABLED"/>
      <enumeration value="DISABLED"/>
    </restriction>
  </simpleType>

  <complexType name="DscpList">
    <sequence>
      <element name="dscp" type="integer"/>
    </sequence>
  </complexType>

  <complexType name="GtpUPathDelayThresholdsType">
    <sequence>
      <element name="n3AveragePacketDelayThreshold " type="integer"/>
      <element name="n3MinPacketDelayThreshold" type="integer"/>
      <element name="n3MaxPacketDelayThreshold" type="integer"/>
      <element name="n9AveragePacketDelayThreshold " type="integer"/>
      <element name="n9MinPacketDelayThreshold" type="integer"/>
      <element name="n9MaxPacketDelayThreshold" type="integer"/>
    </sequence>
  </complexType>

  <simpleType name="QFQoSMonitoringStateType">
    <restriction base="string">
      <enumeration value="ENABLED"/>
      <enumeration value="DISABLED"/>
    </restriction>
  </simpleType>

  <complexType name="5qiList">
    <sequence>
      <element name="5QI" type="integer"/>
    </sequence>
  </complexType>

  <complexType name="QFPacketDelayThresholdsType">
    <sequence>
      <element name="thresholdDl" type="integer"/>
      <element name="thresholUl" type="integer"/>
      <element name="thresholdRtt" type="integer"/>
    </sequence>
  </complexType>

  <element name="AMFFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <element name="attributes">
              <complexType>
                <all>
                    <element name="userLabel" type="string"/>
                  <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                  <element name="pLMNIdList" type="nn:PLMNIdList"/>
                  <element name="aMFIdentifier" type="ngc:aMFIdentifier"/>
                  <element name="sBIFqdn" type="string"/>
                  <element name="snssaiList" type="ngc:SnssaiList" minOccurs="0"/>
                  <element name="aMFSet" type="xn:dn" minOccurs="0"/>
                   <element name="priority" type="integer" minOccurs="0"/>
                    <element name="measurements" type="xn:MeasurementTypesAndGPsList"
minOccurs="0"/>
                    <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
                   <element name="commModelList" type="ngc:CommModelList" minOccurs="1"/>
                </all>
              </complexType>
            </element>
            <choice minOccurs="0" maxOccurs="unbounded">
```

```
              <element ref="ngc:EP_N2"/>
              <element ref="ngc:EP_N8"/>
              <element ref="ngc:EP_N11"/>
              <element ref="ngc:EP_N12"/>
              <element ref="ngc:EP_N14"/>
              <element ref="ngc:EP_N15"/>
              <element ref="ngc:EP_N17"/>
              <element ref="ngc:EP_N22"/>
              <element ref="ngc:EP_N26"/>
              <element ref="ngc:EP_N20"/>
              <element ref="ngc:EP_NLS"/>
              <element ref="ngc:EP_NLG"/>
              <element ref="xn:VsDataContainer"/>
                <element ref="xn:MeasurementControl"/>
            </choice>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>

<element name="SMFFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <element name="attributes">
              <complexType>
                <all>
                    <element name="userLabel" type="string"/>
                  <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                  <element name="pLMNIdList" type="en:PLMNIdList"/>
                  <element name="nRTACList" type="ngc:NrTACList"/>
                  <element name="sBIFqdn" type="string"/>
                  <element name="snssaiList" type="ngc:SnssaiList" minOccurs="0"/>
                   <element name="priority" type="integer" minOccurs="0"/>
                    <element name="measurements" type="xn:MeasurementTypesAndGPsList"
minOccurs="0"/>
                    <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
                  <element name="commModelList" type="ngc:CommModelList" minOccurs="1"/>
                  <element name="configurable5QISetRef" type="xn:dn"/>
                </all>
              </complexType>
            </element>
            <choice minOccurs="0" maxOccurs="unbounded">
              <element ref="ngc:EP_N4"/>
              <element ref="ngc:EP_N10"/>
              <element ref="ngc:EP_N11"/>
              <element ref="ngc:EP_N7"/>
              <element ref="ngc:EP_N16"/>
              <element ref="ngc:EP_S5C"/>
              <element ref="ngc:FiveQiDscpMappingSet"/>
              <element ref="ngc:GtpUPathQoSMonitoringControl"/>
              <element ref="ngc:QFQoSMonitoringControl"/>
              <element ref="xn:VsDataContainer"/>
              <element ref="xn:MeasurementControl"/>
            </choice>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>

<element name="UPFFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <element name="attributes">
              <complexType>
                <all>
                    <element name="userLabel" type="string"/>
                  <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                  <element name="pLMNIdList" type="en:PLMNIdList"/>
                  <element name="nRTACList" type="ngc:NrTACList"/>
                  <element name="snssaiList" type="ngc:SnssaiList" minOccurs="0"/>
                   <element name="priority" type="integer" minOccurs="0"/>
```

```
                    <element name="measurements" type="xn:MeasurementTypesAndGPsList"
minOccurs="0"/>
                    <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
                    <element name="commModelList" type="ngc:CommModelList" minOccurs="1"/>
                </all>
              </complexType>
            </element>
            <choice minOccurs="0" maxOccurs="unbounded">
              <element ref="ngc:EP_N4"/>
              <element ref="ngc:EP_N3"/>
              <element ref="ngc:EP_N9"/>
              <element ref="ngc:EP_S5U"/>
              <element ref="ngc:EP_N6"/>
              <element ref="xn:VsDataContainer"/>
            <element ref="xn:MeasurementControl"/>
            </choice>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>

  <element name="N3IWFFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <element name="attributes">
              <complexType>
                <all>
                    <element name="userLabel" type="string"/>
                  <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                  <element name="pLMNIdList" type="en:PLMNIdList"/>
                   <element name="priority" type="integer" minOccurs="0"/>
                    <element name="measurements" type="xn:MeasurementTypesAndGPsList"
minOccurs="0"/>
                    <element name="commModelList" type="ngc:CommModelList" minOccurs="1"/>
                </all>
              </complexType>
            </element>
            <choice minOccurs="0" maxOccurs="unbounded">
              <element ref="ngc:EP_N2"/>
              <element ref="ngc:EP_N3"/>
              <element ref="xn:VsDataContainer"/>
              <element ref="xn:MeasurementControl"/>

            </choice>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>

  <element name="PCFFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <element name="attributes">
              <complexType>
                <all>
                    <element name="userLabel" type="string"/>
                  <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                  <element name="pLMNIdList" type="en:PLMNIdList" />
                  <element name="sBIFqdn" type="string" />
                  <element name="snssaiList" type="ngc:SnssaiList" minOccurs="0"/>
                   <element name="priority" type="integer" minOccurs="0"/>
                    <element name="measurements" type="xn:MeasurementTypesAndGPsList"
minOccurs="0"/>
                    <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
                   <element name="commModelList" type="ngc:CommModelList" minOccurs="1"/>
                </all>
              </complexType>
            </element>
            <choice minOccurs="0" maxOccurs="unbounded">
              <element ref="ngc:EP_N7"/>
              <element ref="ngc:EP_N15"/>
              <element ref="ngc:EP_N16"/>
```

```
            <element ref="ngc:EP_N5"/>
            <element ref="ngc:EP_Rx"/>
            <element ref="xn:VsDataContainer"/>
          <element ref="xn:MeasurementControl"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="AUSFFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
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    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
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            <complexType>
              <all>
                  <element name="userLabel" type="string"/>
                <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                <element name="pLMNIdList" type="en:PLMNIdList"/>
                <element name="sBIFqdn" type="string"/>
                <element name="snssaiList" type="ngc:SnssaiList" minOccurs="0"/>
                 <element name="priority" type="integer" minOccurs="0"/>
              <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
                  <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="ngc:EP_N12"/>
            <element ref="ngc:EP_N13"/>
            <element ref="xn:VsDataContainer"/>
          <element ref="xn:MeasurementControl"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="UDMFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes">
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              <all>
                  <element name="userLabel" type="string"/>
                <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                <element name="pLMNIdList" type="en:PLMNIdList"/>
                <element name="sBIFqdn" type="string"/>
                <element name="snssaiList" type="ngc:SnssaiList" minOccurs="0"/>
                 <element name="priority" type="integer" minOccurs="0"/>
              <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
      <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
          <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
          </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="ngc:EP_N8"/>
            <element ref="ngc:EP_N10"/>
            <element ref="ngc:EP_N13"/>
            <element ref="xn:VsDataContainer"/>
              <element ref="xn:MeasurementControl"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="UDRFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
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    <complexContent>
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                <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                <element name="pLMNIdList" type="en:PLMNIdList"/>
                <element name="sBIFqdn" type="string"/>
                <element name="snssaiList" type="ngc:SnssaiList" minOccurs="0"/>
                 <element name="priority" type="integer" minOccurs="0"/>
              <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
              <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
              </all>
            </complexType>
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          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
              <element ref="xn:MeasurementControl"/>
          </choice>
        </sequence>
      </extension>
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  </complexType>
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<element name="UDSFFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
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            <complexType>
              <all>
                  <element name="userLabel" type="string"/>
                <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                <element name="pLMNIdList" type="en:PLMNIdList"/>
                <element name="sBIFqdn" type="string"/>
                <element name="snssaiList" type="ngc:SnssaiList" minOccurs="0"/>
                 <element name="priority" type="integer" minOccurs="0"/>
              <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
          <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
                  <element name="commModelList" type="ngc:CommModelList" minOccurs="1"/>
              </all>
            </complexType>
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          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
              <element ref="xn:MeasurementControl"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="NRFFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
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    <complexContent>
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              <all>
              <element name="userLabel" type="string"/>
                <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                <element name="pLMNIdList" type="en:PLMNIdList"/>
                <element name="sBIFqdn" type="string"/>
                <element name="cNSIIdList" type="ngc:CNSIIdList" minOccurs="0"/>
                <element name="nFProfileList" type="ngc:NFProfileList" minOccurs="0"/>
                <element name="snssaiList" type="ngc:SnssaiList" minOccurs="0"/>
                 <element name="priority" type="integer" minOccurs="0"/>
              <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
                  <element name="commModelList" type="ngc:CommModelList" minOccurs="1"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
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```
            <element ref="ngc:EP_N27"/>
            <element ref="xn:VsDataContainer"/>
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          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="NSSFFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
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    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
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                <element name="pLMNIdList" type="en:PLMNIdList"/>
                <element name="sBIFqdn" type="string"/>
                <element name="cNSIIdList" type="ngc:CNSIIdList"/>
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name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
            <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
                  <element name="commModelList" type="ngc:CommModelList" minOccurs="1"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
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            <element ref="ngc:EP_N31"/>
            <element ref="xn:VsDataContainer"/>
              <element ref="xn:MeasurementControl"/>
          </choice>
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      </extension>
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<element name="SMSFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
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    <complexContent>
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          <element name="attributes">
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                <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                <element name="pLMNIdList" type="en:PLMNIdList"/>
                <element name="sBIFqdn" type="string"/>
                 <element name="priority" type="integer" minOccurs="0"/>
              <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
          <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
                <element name="commModelList" type="ngc:CommModelList" minOccurs="1"/>
              </all>
            </complexType>
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            <element ref="ngc:EP_N21"/>
            <element ref="ngc:EP_MAP_SMSC"/>
            <element ref="xn:VsDataContainer"/>
          <element ref="xn:MeasurementControl"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="LMFFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
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```
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              <all>
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                <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                <element name="pLMNIdList" type="en:PLMNIdList"/>
                 <element name="priority" type="integer" minOccurs="0"/>
              <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
              <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
                  <element name="commModelList" type="ngc:CommModelList" minOccurs="1"/>
                </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="ngc:EP_NLS"/>
            <element ref="xn:VsDataContainer"/>
          <element ref="xn:MeasurementControl"/>           </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="NGEIRFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes">
            <complexType>
              <all>
                  <element name="userLabel" type="string"/>
                <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                <element name="pLMNIdList" type="en:PLMNIdList"/>
                <element name="sBIFqdn" type="string"/>
                <element name="snssaiList" type="ngc:SnssaiList" minOccurs="0"/>
                 <element name="priority" type="integer" minOccurs="0"/>
              <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
              <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
                <element name="commModelList" type="ngc:CommModelList" minOccurs="1"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="ngc:EP_N17"/>
            <element ref="xn:VsDataContainer"/>
          <element ref="xn:MeasurementControl"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
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</element>

<element name="SEPPFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
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              <all>
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                <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                <element name="pLMNId" type="en:PLMNId"/>
                 <element name="priority" type="integer" minOccurs="0"/>
                  <element name="sEPPType" type="nn:SEPPType"/>
                  <element name="sEPPId" type="integer"/>
                  <element name="fqdn" type="string"/>
              <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="ngc:EP_N32"/>
            <element ref="xn:VsDataContainer"/>
```

```
            <element ref="xn:MeasurementControl"/>
            </choice>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
  <element name="ExternalSEPPFunction"
substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <element name="attributes">
              <complexType>
                <all>
                    <element name="userLabel" type="string"/>
                  <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                  <element name="pLMNId" type="en:PLMNId"/>
                    <element name="priority" type="integer" minOccurs="0"/>
                    <element name="sEPPId" type="integer"/>
                    <element name="fqdn" type="string"/>
                <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
                </all>
              </complexType>
            </element>
            <choice minOccurs="0" maxOccurs="unbounded">
              <element ref="ngc:EP_N32"/>
              <element ref="xn:VsDataContainer"/>
            <element ref="xn:MeasurementControl"/>
            </choice>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
  <element name="NWDAFFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <element name="attributes">
              <complexType>
                <all>
                    <element name="userLabel" type="string"/>
                  <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                  <element name="pLMNIdList" type="en:PLMNIdList"/>
                  <element name="sBIFqdn" type="string"/>
                  <element name="snssaiList" type="ngc:SnssaiList" minOccurs="0"/>
                   <element name="priority" type="integer" minOccurs="0"/>
                <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
                <element name="managedNFProfile" type="ngc:managedNFProfile" minOccurs="0"/>
                  <element name="commModelList" type="ngc:CommModelList" minOccurs="1"/>
                </all>
              </complexType>
            </element>
            <choice minOccurs="0" maxOccurs="unbounded">
              <element ref="xn:VsDataContainer"/>
            <element ref="xn:MeasurementControl"/>
            </choice>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>

  <element name="SCPFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
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      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <element name="attributes">
              <complexType>
                <all>
                  <element name="userLabel" type="string"/>
                  <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                   <element name="priority" type="integer" minOccurs="0"/>
                  <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
```

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                <element name="supportedFuncList" type="ngc:SupportedFuncList"/>
                 <element name="address" type="string"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
            <element ref="xn:MeasurementControl"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="NEFFunction" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
  <complexType>
    <complexContent>
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        <sequence>
          <element name="attributes">
            <complexType>
              <all>
                <element name="userLabel" type="string"/>
                <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                 <element name="priority" type="integer" minOccurs="0"/>
                <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
                <element name="sBIFqdn" type="string"/>
                <element name="snssaiList" type="ngc:SnssaiList" minOccurs="0"/>
                <element name="managedNFProfile" type="ngc:ManagedNFProfile"/>
                 <element name="capabilitylist" type="ngc:CapabilityList"/>
                <element name="isINEF" type="boolean"/>
                 <element name="isCAPIFSup" type="boolean"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
            <element ref="xn:MeasurementControl"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="EP_N2">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
              <all>
                <!-- Inherited attributes from EP_RP -->
                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemoteEndPoint" minOccurs="0"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="EP_N3">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
```

```
            <complexType>
              <all>
                <!-- Inherited attributes from EP_RP -->
                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
              <element name="remoteAddress" type="ngc:RemoteEndPoint" minOccurs="0"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
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        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>
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  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
              <all>
                <!-- Inherited attributes from EP_RP -->
                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemoteEndPoint" minOccurs="0"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="EP_N5">
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    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
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            <complexType>
              <all>
                <!-- Inherited attributes from EP_RP -->
                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemotePoint" minOccurs="0"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="EP_N6">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
```

```
              <all>
                <!-- Inherited attributes from EP_RP -->
                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemotePoint" minOccurs="0"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

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    <complexContent>
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        <sequence>
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            <complexType>
              <all>
                <!-- Inherited attributes from EP_RP -->
                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemotePoint" minOccurs="0"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
          </choice>
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    </complexContent>
  </complexType>
</element>

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    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
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            <complexType>
              <all>
                <!-- Inherited attributes from EP_RP -->
                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemotePoint" minOccurs="0"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
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        </sequence>
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    </complexContent>
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</element>

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    <complexContent>
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```

```
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemoteEndPoint" minOccurs="0"/>
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:Remote" minOccurs="0"/>
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                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
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```

```
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemoteEndPoint" minOccurs="0"/>
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          <choice minOccurs="0" maxOccurs="unbounded">
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                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemoteEndPoint" minOccurs="0"/>
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemoteEndPoint" minOccurs="0"/>
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            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
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```
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                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemoteEndPoint" minOccurs="0"/>
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemotePoint" minOccurs="0"/>
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```
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:Local" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemotePoint" minOccurs="0"/>
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:Local" minOccurs="0"/>
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                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
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```

```
              <all>
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemoteEndPoint" minOccurs="0"/>
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                <element name="remoteAddress" type="ngc:RemoteEndPoint" minOccurs="0"/>
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
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                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
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    </complexContent>
  </complexType>
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```

```
                <!-- Inherited attributes from EP_RP -->
                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
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                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <!-- End of inherited attributes from EP_RP -->
                <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
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                <!-- End of inherited attributes from EP_RP -->
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                <!-- End of inherited attributes from EP_RP -->
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                <element name="farEndEntity" type="xn:dn" minOccurs="0"/>
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                <!-- End of inherited attributes from EP_RP -->
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                  <!-- End of inherited attributes from EP_RP -->
                  <element name="localAddress" type="ngc:LocalEndPoint" minOccurs="0"/>
                  <element name="remoteAddress" type="ngc:RemoteEndPoint" minOccurs="0"/>
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            </element>
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                  <element name="gtpUPathMonitoredSNSSAIs" type="ngc:SnssaiList"/>
```

```
                  <element name="monitoredDSCPs" type="ngc:DscpList"/>
                  <element name="isEventTriggeredGtpUPathMonitoringSupported" type="boolean"/>
                  <element name="isPeriodicGtpUMonitoringSupported" type="boolean"/>
                  <element name="isImmediateGtpUMonitoringSupported" type="boolean"/>
                  <element name="gtpUPathDelayThresholds" type="ngc:GtpUPathDelayThresholdsType"
minOccurs="0"/>
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                   <element name="gtpUPathMeasurementPeriod" type="integer" minOccurs="0"/>
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            <choice minOccurs="0" maxOccurs="unbounded">
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                  <element name="qFMonitoredSNSSAIs" type="ngc:SnssaiList"/>
                  <element name="qFMonitored5QIs" type="ngc:5qiList"/>
                  <element name="isEventTriggeredQFMonitoringSupported" type="boolean"/>
                  <element name="isPeriodicQFMonitoringSupported" type="boolean"/>
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                  <element name="qFPacketDelayThresholds" type="ngc:QFPacketDelayThresholdsType"
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  </element>
</schema>
```

Annex G (normative): OpenAPI definition of the 5GC NRM

G.1 General

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

The Information Service (IS) of the NR NRM is defined in clause 4.

Mapping rules to produce the OpenAPI definition based on the IS are defined in 3GPP TS 32.160 [14].

G.2 Void

G.3 Void

G.4 Solution Set (SS) definitions

G.4.1 Void

G.4.2 Void

G.4.3 OpenAPI document "5gcNrm.yaml"

```
openapi: 3.0.1
info:
  title: 3GPP 5GC NRM
  version: 16.5.0
  description: >-
    OAS 3.0.1 specification of the 5GC NRM
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 28.541 V16.4.0; 5G NRM, 5GC NRM
  url: http://www.3gpp.org/ftp/Specs/archive/28_series/28.541/
paths: {}
components:
  schemas:

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

    AmfIdentifier:
      type: object
      description: 'AmfIdentifier comprise of amfRegionId, amfSetId and amfPointer'
      properties:
        amfRegionId:
          $ref: '#/components/schemas/AmfRegionId'
        amfSetId:
          $ref: '#/components/schemas/AmfSetId'
```

```
      amfPointer:
        $ref: '#/components/schemas/AmfPointer'
  AmfRegionId:
    type: integer
    description: AmfRegionId is defined in TS 23.003
    maximum: 255
  AmfSetId:
    type: string
    description: AmfSetId is defined in TS 23.003
    maximum: 1023
  AmfPointer:
    type: integer
    description: AmfPointer is defined in TS 23.003
    maximum: 63
  IpEndPoint:
    type: object
    properties:
      ipv4Address:
        $ref: 'genericNrm.yaml#/components/schemas/Ipv4Addr'
      ipv6Address:
        $ref: 'genericNrm.yaml#/components/schemas/Ipv6Addr'
      ipv6Prefix:
        $ref: 'genericNrm.yaml#/components/schemas/Ipv6Prefix'
      transport:
        $ref: 'genericNrm.yaml#/components/schemas/TransportProtocol'
      port:
        type: integer
  NFProfileList:
    type: array
    description: List of NF profile
    items:
      $ref: '#/components/schemas/NFProfile'
  NFProfile:
    type: object
    description: 'NF profile stored in NRF, defined in TS 29.510'
    properties:
      nFInstanceId:
        type: string
        description: uuid of NF instance
      nFType:
        $ref: 'genericNrm.yaml#/components/schemas/NFType'
      nFStatus:
        $ref: '#/components/schemas/NFStatus'
      plmn:
        $ref: 'nrNrm.yaml#/components/schemas/PlmnId'
      sNssais:
        $ref: 'nrNrm.yaml#/components/schemas/Snssai'
      fqdn:
        $ref: 'genericNrm.yaml#/components/schemas/Fqdn'
      interPlmnFqdn:
        $ref: 'genericNrm.yaml#/components/schemas/Fqdn'
      nfServices:
        type: array
        items:
          $ref: '#/components/schemas/NFService'
  NFService:
    type: object
    description: NF Service is defined in TS 29.510
    properties:
      serviceInstanceId:
        type: string
      serviceName:
        type: string
      version:
        type: string
      schema:
        type: string
      fqdn:
        $ref: 'genericNrm.yaml#/components/schemas/Fqdn'
      interPlmnFqdn:
        $ref: 'genericNrm.yaml#/components/schemas/Fqdn'
      ipEndPoints:
        type: array
        items:
          $ref: '#/components/schemas/IpEndPoint'
      apiPrfix:
        type: string
      allowedPlmns:
```

```
      $ref: 'nrNrm.yaml#/components/schemas/PlmnId'
    allowedNfTypes:
      type: array
      items:
        $ref: 'genericNrm.yaml#/components/schemas/NFType'
    allowedNssais:
      type: array
      items:
        $ref: 'nrNrm.yaml#/components/schemas/Snssai'
NFStatus:
  type: string
  description: any of enumrated value
  enum:
    - REGISTERED
    - SUSPENDED
CNSIIdList:
  type: array
  items:
    $ref: '#/components/schemas/CNSIId'
CNSIId:
  type: string
  description: CNSI Id is defined in TS 29.531, only for Core Network
TACList:
  type: array
  items:
    $ref: 'nrNrm.yaml#/components/schemas/NrTac'
WeightFactor:
  type: integer
UdmInfo:
  type: object
  properties:
    nFSrvGroupId:
      type: string
AusfInfo:
  type: object
  properties:
    nFSrvGroupId:
      type: string
UpfInfo:
  type: object
  properties:
    smfServingAreas:
      type: string
AmfInfo:
  type: object
  properties:
    priority:
      type: integer
SupportedDataSetId:
  type: string
  description: any of enumrated value
  enum:
    - SUBSCRIPTION
    - POLICY
    - EXPOSURE
    - APPLICATION
Udrinfo:
  type: object
  properties:
    supportedDataSetIds:
      type: array
      items:
        $ref: '#/components/schemas/SupportedDataSetId'
    nFSrvGroupId:
      type: string
NFInfo:
  oneOf:
    - $ref: '#/components/schemas/UdmInfo'
    - $ref: '#/components/schemas/AusfInfo'
    - $ref: '#/components/schemas/UpfInfo'
    - $ref: '#/components/schemas/AmfInfo'
    - $ref: '#/components/schemas/Udrinfo'
ManagedNFProfile:
  type: object
  properties:
    nfInstanceID:
      type: string
    nfType:
```

```
        $ref: 'genericNrm.yaml#/components/schemas/NFType'
      authzInfo:
        type: string
      hostAddr:
        $ref: 'genericNrm.yaml#/components/schemas/HostAddr'
      locality:
        type: string
      nFInfo:
        $ref: '#/components/schemas/NFInfo'
      capacity:
        type: integer
  SEPPType:
    type: string
    description: any of enumrated value
    enum:
      - CSEPP
      - PSEPP
  SupportedFunc:
    type: object
    properties:
      function:
        type: string
      policy:
        type: string
  SupportedFuncList:
    type: array
    items:
      $ref: '#/components/schemas/SupportedFunc'
  CommModelType:
    type: string
    description: any of enumrated value
    enum:
      - DIRECT_COMMUNICATION_WO_NRF
      - DIRECT_COMMUNICATION_WITH_NRF
      - INDIRECT_COMMUNICATION_WO_DEDICATED_DISCOVERY
      - INDIRECT_COMMUNICATION_WITH_DEDICATED_DISCOVERY
  CommModel:
    type: object
    properties:
      groupId:
        type: integer
      commModelType:
        $ref: '#/components/schemas/CommModelType'
      targetNFServiceList:
        $ref: 'genericNrm.yaml#/components/schemas/DnList'
      commModelConfiguration:
        type: string
  CommModelList:
    type: array
    items:
      $ref: '#/components/schemas/CommModel'
  CapabilityList:
    type: array
    items:
      type: string
  FiveQiDscpMapping:
    type: object
    properties:
      fiveQIValues:
        type: array
        items:
        type: integer
      dscp:
        type: integer

  PacketErrorRate:
    type: object
    properties:
      scalar:
        type: integer
      exponent:
        type: integer
  FiveQICharacteristics:
    type: object
    properties:
      fiveQIValue:
        type: integer
      resourceType:
```

```
          type: string
          enum:
            - GBR
            - NonGBR
        priorityLevel:
          type: integer
        packetDelayBudget:
          type: integer
        packetErrorRate:
          $ref: '#/components/schemas/PacketErrorRate'
        averagingWindow:
          type: integer
        maximumDataBurstVolume:
          type: integer


    GtpUPathDelayThresholdsType:
      type: object
      properties:
        n3AveragePacketDelayThreshold:
          type: integer
        n3MinPacketDelayThreshold:
          type: integer
        n3MaxPacketDelayThreshold:
          type: integer
        n9AveragePacketDelayThreshold:
          type: integer
        n9MinPacketDelayThreshold:
          type: integer
        n9MaxPacketDelayThreshold:
          type: integer
    QFPacketDelayThresholdsType:
      type: object
      properties:
        thresholdDl:
          type: integer
        thresholdUl:
          type: integer
        thresholdRtt:
          type: integer


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

    SubNetwork-Single:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNrm.yaml#/components/schemas/SubNetwork-Attr'
        - $ref: 'genericNrm.yaml#/components/schemas/SubNetwork-ncO'
        - type: object
          properties:
            SubNetwork:
              $ref: '#/components/schemas/SubNetwork-Multiple'
            ManagedElement:
              $ref: '#/components/schemas/ManagedElement-Multiple'
            ExternalAmfFunction:
              $ref: '#/components/schemas/ExternalAmfFunction-Multiple'
            ExternalNrfFunction:
              $ref: '#/components/schemas/ExternalNrfFunction-Multiple'
            ExternalNssfFunction:
                $ref: '#/components/schemas/ExternalNssfFunction-Multiple'
            AmfSet:
              $ref: '#/components/schemas/AmfSet-Multiple'
            AmfRegion:
              $ref: '#/components/schemas/AmfRegion-Multiple'
            Configurable5QISet:
              $ref: '#/components/schemas/Configurable5QISet-Multiple'

    ManagedElement-Single:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
```

```
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedElement-Attr'
      - $ref: 'genericNrm.yaml#/components/schemas/ManagedElement-ncO'
      - type: object
        properties:
          AmfFunction:
            $ref: '#/components/schemas/AmfFunction-Multiple'
          SmfFunction:
            $ref: '#/components/schemas/SmfFunction-Multiple'
          UpfFunction:
            $ref: '#/components/schemas/UpfFunction-Multiple'
          N3iwfFunction:
            $ref: '#/components/schemas/N3iwfFunction-Multiple'
          PcfFunction:
            $ref: '#/components/schemas/PcfFunction-Multiple'
          AusfFunction:
            $ref: '#/components/schemas/AusfFunction-Multiple'
          UdmFunction:
            $ref: '#/components/schemas/UdmFunction-Multiple'
          UdrFunction:
            $ref: '#/components/schemas/UdrFunction-Multiple'
          UdsfFunction:
            $ref: '#/components/schemas/UdsfFunction-Multiple'
          NrfFunction:
            $ref: '#/components/schemas/NrfFunction-Multiple'
          NssfFunction:
            $ref: '#/components/schemas/NssfFunction-Multiple'
          SmsfFunction:
            $ref: '#/components/schemas/SmsfFunction-Multiple'
          LmfFunction:
            $ref: '#/components/schemas/LmfFunction-Multiple'
          NgeirFunction:
            $ref: '#/components/schemas/NgeirFunction-Multiple'
          SeppFunction:
            $ref: '#/components/schemas/SeppFunction-Multiple'
          NwdafFunction:
            $ref: '#/components/schemas/NwdafFunction-Multiple'
          ScpFunction:
            $ref: '#/components/schemas/ScpFunction-Multiple'
          NefFunction:
            $ref: '#/components/schemas/NefFunction-Multiple'
          Configurable5QISet:
            $ref: '#/components/schemas/Configurable5QISet-Multiple'

    AmfFunction-Single:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                    amfIdentifier:
                      $ref: '#/components/schemas/AmfIdentifier'
                    sBIFqdn:
                      type: string
                    weightFactor:
                      $ref: '#/components/schemas/WeightFactor'
                    snssaiList:
                      $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
                    amfSet:
                      $ref: 'genericNrm.yaml#/components/schemas/Dn'
                    managedNFProfile:
                      $ref: '#/components/schemas/ManagedNFProfile'
                    commModelList:
                      $ref: '#/components/schemas/CommModelList'
        - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            EP_N2:
              $ref: '#/components/schemas/EP_N2-Multiple'
            EP_N8:
              $ref: '#/components/schemas/EP_N8-Multiple'
            EP_N11:
```

```
          $ref: '#/components/schemas/EP_N11-Multiple'
        EP_N12:
          $ref: '#/components/schemas/EP_N12-Multiple'
        EP_N14:
          $ref: '#/components/schemas/EP_N14-Multiple'
        EP_N15:
          $ref: '#/components/schemas/EP_N15-Multiple'
        EP_N17:
          $ref: '#/components/schemas/EP_N17-Multiple'
        EP_N20:
          $ref: '#/components/schemas/EP_N20-Multiple'
        EP_N22:
          $ref: '#/components/schemas/EP_N22-Multiple'
        EP_N26:
          $ref: '#/components/schemas/EP_N26-Multiple'
        EP_NLS:
          $ref: '#/components/schemas/EP_NLS-Multiple'
        EP_NLG:
          $ref: '#/components/schemas/EP_NLG-Multiple'
AmfSet-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                nRTACList:
                  $ref: '#/components/schemas/TACList'
                amfSetId:
                  $ref: '#/components/schemas/AmfSetId'
                snssaiList:
                  $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
AmfRegion-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                nRTACList:
                  $ref: '#/components/schemas/TACList'
                amfRegionId:
                  $ref: '#/components/schemas/AmfRegionId'
                snssaiList:
                  $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
SmfFunction-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                nRTACList:
                  $ref: '#/components/schemas/TACList'
                sBIFqdn:
                  type: string
                snssaiList:
                  $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
                commModelList:
                  $ref: '#/components/schemas/CommModelList'
                Configurable5QISetRef:
```

```
                  $ref: 'genericNRM.yaml#/components/schemas/Dn'

    - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        EP_N4:
          $ref: '#/components/schemas/EP_N4-Multiple'
        EP_N7:
          $ref: '#/components/schemas/EP_N7-Multiple'
        EP_N10:
          $ref: '#/components/schemas/EP_N10-Multiple'
        EP_N11:
          $ref: '#/components/schemas/EP_N11-Multiple'
        EP_N16:
          $ref: '#/components/schemas/EP_N16-Multiple'
        EP_S5C:
          $ref: '#/components/schemas/EP_S5C-Multiple'
        FiveQiDscpMappingSet:
          $ref: '#/components/schemas/FiveQiDscpMappingSet-Single'
        GtpUPathQoSMonitoringControl:
          $ref: '#/components/schemas/GtpUPathQoSMonitoringControl-Single'
        QFQoSMonitoringControl:
          $ref: '#/components/schemas/QFQoSMonitoringControl-Single'

  UpfFunction-Single:
    allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
          - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
          - type: object
            properties:
              plmnIdList:
                $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
              nRTACList:
                $ref: '#/components/schemas/TACList'
              snssaiList:
                $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
              managedNFProfile:
                $ref: '#/components/schemas/ManagedNFProfile'
              commModelList:
                $ref: '#/components/schemas/CommModelList'
    - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        EP_N3:
          $ref: '#/components/schemas/EP_N3-Multiple'
        EP_N4:
          $ref: '#/components/schemas/EP_N4-Multiple'
        EP_N6:
          $ref: '#/components/schemas/EP_N6-Multiple'
        EP_N9:
          $ref: '#/components/schemas/EP_N9-Multiple'
        EP_S5U:
          $ref: '#/components/schemas/EP_S5U-Multiple'
  N3iwfFunction-Single:
    allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
          - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
          - type: object
            properties:
              plmnIdList:
                $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
              commModelList:
                $ref: '#/components/schemas/CommModelList'
    - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        EP_N3:
          $ref: '#/components/schemas/EP_N3-Multiple'
        EP_N4:
          $ref: '#/components/schemas/EP_N4-Multiple'
```

```
    PcfFunction-Single:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                    sBIFqdn:
                      type: string
                    snssaiList:
                      $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
                    managedNFProfile:
                      $ref: '#/components/schemas/ManagedNFProfile'
                    commModelList:
                      $ref: '#/components/schemas/CommModelList'
        - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            EP_N5:
              $ref: '#/components/schemas/EP_N5-Multiple'
            EP_N7:
              $ref: '#/components/schemas/EP_N7-Multiple'
            EP_N15:
              $ref: '#/components/schemas/EP_N15-Multiple'
            EP_N16:
              $ref: '#/components/schemas/EP_N16-Multiple'
            EP_Rx:
              $ref: '#/components/schemas/EP_Rx-Multiple'
    AusfFunction-Single:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                    sBIFqdn:
                      type: string
                    snssaiList:
                      $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
                    managedNFProfile:
                      $ref: '#/components/schemas/ManagedNFProfile'
                    commModelList:
                      $ref: '#/components/schemas/CommModelList'
        - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            EP_N12:
              $ref: '#/components/schemas/EP_N12-Multiple'
            EP_N13:
              $ref: '#/components/schemas/EP_N13-Multiple'
    UdmFunction-Single:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                    sBIFqdn:
                      type: string
                    snssaiList:
                      $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
                    managedNFProfile:
                      $ref: '#/components/schemas/ManagedNFProfile'
```

```
                commModelList:
                  $ref: '#/components/schemas/CommModelList'
    - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        EP_N8:
          $ref: '#/components/schemas/EP_N8-Multiple'
        EP_N10:
          $ref: '#/components/schemas/EP_N10-Multiple'
        EP_N13:
          $ref: '#/components/schemas/EP_N13-Multiple'
UdrFunction-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                sBIFqdn:
                  type: string
                snssaiList:
                  $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
UdsfFunction-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                sBIFqdn:
                  type: string
                snssaiList:
                  $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
NrfFunction-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                sBIFqdn:
                  type: string
                cNSIIdList:
                  $ref: '#/components/schemas/CNSIIdList'
                nFProfileList:
                  $ref: '#/components/schemas/NFProfileList'
                snssaiList:
                  $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
    - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        EP_N27:
          $ref: '#/components/schemas/EP_N27-Multiple'
NssfFunction-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
```

```
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                sBIFqdn:
                  type: string
                cNSIIdList:
                  $ref: '#/components/schemas/CNSIIdList'
                nFProfileList:
                  $ref: '#/components/schemas/NFProfileList'
                snssaiList:
                  $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
                commModelList:
                  $ref: '#/components/schemas/CommModelList'
    - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        EP_N22:
          $ref: '#/components/schemas/EP_N22-Multiple'
        EP_N31:
          $ref: '#/components/schemas/EP_N31-Multiple'
SmsfFunction-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                sBIFqdn:
                  type: string
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
                commModelList:
                  $ref: '#/components/schemas/CommModelList'
    - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        EP_N20:
          $ref: '#/components/schemas/EP_N20-Multiple'
        EP_N21:
          $ref: '#/components/schemas/EP_N21-Multiple'
        EP_MAP_SMSC:
          $ref: '#/components/schemas/EP_MAP_SMSC-Multiple'
LmfFunction-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
                commModelList:
                  $ref: '#/components/schemas/CommModelList'
    - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        EP_NLS:
          $ref: '#/components/schemas/EP_NLS-Multiple'
NgeirFunction-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
```

```
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                sBIFqdn:
                  type: string
                snssaiList:
                  $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
                commModelList:
                  $ref: '#/components/schemas/CommModelList'
    - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        EP_N17:
          $ref: '#/components/schemas/EP_N17-Multiple'
SeppFunction-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnId:
                  $ref: 'nrNrm.yaml#/components/schemas/PlmnId'
                sEPPType:
                  $ref: '#/components/schemas/SEPPType'
                sEPPId:
                  type: integer
                fqdn:
                  $ref: 'genericNrm.yaml#/components/schemas/Fqdn'
    - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        EP_N32:
          $ref: '#/components/schemas/EP_N32-Multiple'
NwdafFunction-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                sBIFqdn:
                  type: string
                snssaiList:
                  $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
                commModelList:
                  $ref: '#/components/schemas/CommModelList'
ScpFunction-Single:
  allOf:
    - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                supportedFuncList:
                  $ref: '#/components/schemas/SupportedFuncList'
                address:
                  $ref: 'genericNrm.yaml#/components/schemas/HostAddr'
    - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'
NefFunction-Single:
  allOf:
```

```
      - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
              - type: object
                properties:
                  sBIFqdn:
                    type: string
                  snssaiList:
                    $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
                  managedNFProfile:
                    $ref: '#/components/schemas/ManagedNFProfile'
                  capabilityList:
                    $ref: '#/components/schemas/CapabilityList'
                  isINEF:
                    type: boolean
                  isCAPIFSup:
                    type: boolean
      - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-ncO'

    ExternalAmfFunction-Single:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
                    amfIdentifier:
                      $ref: '#/components/schemas/AmfIdentifier'
    ExternalNrfFunction-Single:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
    ExternalNssfFunction-Single:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
    ExternalSeppFunction-Single:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnId:
                      $ref: 'nrNrm.yaml#/components/schemas/PlmnId'
                    sEPPId:
                      type: integer
                    fqdn:
                      $ref: 'genericNrm.yaml#/components/schemas/Fqdn'
```

```
    EP_N2-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N3-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N4-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N5-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N6-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N7-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
```

```
            - type: object
              properties:
                localAddress:
                  $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                remoteAddress:
                  $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N8-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N9-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N10-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N11-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N12-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N13-Single:
      allOf:
```

```
      - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N14-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N15-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N16-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N17-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'

    EP_N20-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
```

```
              properties:
                localAddress:
                  $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                remoteAddress:
                  $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'

    EP_N21-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N22-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'

    EP_N26-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N27-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'


    EP_N31-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
```

```
                $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N32-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    remotePlmnId:
                      $ref: 'nrNrm.yaml#/components/schemas/PlmnId'
                    remoteSeppAddress:
                      $ref: 'genericNrm.yaml#/components/schemas/HostAddr'
                    remoteSeppId:
                      type: integer
                    n32cParas:
                      type: string
                    n32fPolicy:
                      type: string
                    withIPX:
                      type: boolean

    EP_S5C-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_S5U-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_Rx-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_MAP_SMSC-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
```

```
                remoteAddress:
                  $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_NLS-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'
    EP_NLG-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNRM.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'nrNrm.yaml#/components/schemas/RemoteAddress'

    FiveQiDscpMappingSet-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    FiveQiDscpMappingList:
                      type: array
                      items:
                        $ref: '#/components/schemas/FiveQiDscpMapping'

    Configurable5QISet-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    configurable5QIs:
                      type: array
                      items:
                        $ref: '#/components/schemas/FiveQICharacteristics'
    GtpUPathQoSMonitoringControl-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    gtpUPathQoSMonitoringState:
                      type: string
                      enum:
                        - ENABLED
                        - DISABLED
                    gtpUPathMonitoredSNSSAIs:
                      type: array
                      items:
                        $ref: 'nrNrm.yaml#/components/schemas/Snssai'
                    monitoredDSCPs:
                      type: array
```

```
                    items:
                      type: integer
                      minimum: 0
                      maximum: 255
                  isEventTriggeredGtpUPathMonitoringSupported:
                    type: boolean
                  isPeriodicGtpUMonitoringSupported:
                    type: boolean
                  isImmediateGtpUMonitoringSupported:
                    type: boolean
                  gtpUPathDelayThresholds:
                    $ref: '#/components/schemas/GtpUPathDelayThresholdsType'
                  gtpUPathMinimumWaitTime:
                    type: integer
                  gtpUPathMeasurementPeriod:
                    type: integer

    QFQoSMonitoringControl-Single:
      allOf:
        - $ref: 'genericNRM.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    qFQoSMonitoringState:
                      type: string
                      enum:
                        - ENABLED
                        - DISABLED
                    qFMonitoredSNSSAIs:
                      type: array
                      items:
                        $ref: 'nrNrm.yaml#/components/schemas/Snssai'
                    qFMonitored5QIs:
                      type: array
                      items:
                        type: integer
                        minimum: 0
                        maximum: 255
                    isEventTriggeredQFMonitoringSupported:
                      type: boolean
                    isPeriodicQFMonitoringSupported:
                      type: boolean
                    isSessionReleasedQFMonitoringSupported:
                      type: boolean
                    qFPacketDelayThresholds:
                      $ref: '#/components/schemas/QFPacketDelayThresholdsType'
                    qFMinimumWaitTime:
                      type: integer
                    qFMeasurementPeriod:
                      type: integer


#-------- 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'
    AmfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/AmfFunction-Single'
    SmfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/SmfFunction-Single'
    UpfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/UpfFunction-Single'
    N3iwfFunction-Multiple:
```

```
      type: array
      items:
        $ref: '#/components/schemas/N3iwfFunction-Single'
    PcfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/PcfFunction-Single'
    AusfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/AusfFunction-Single'
    UdmFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/UdmFunction-Single'
    UdrFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/UdrFunction-Single'
    UdsfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/UdsfFunction-Single'
    NrfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NrfFunction-Single'
    NssfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NssfFunction-Single'
    SmsfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/SmsfFunction-Single'
    LmfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/LmfFunction-Single'
    NgeirFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NgeirFunction-Single'
    SeppFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/SeppFunction-Single'
    NwdafFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NwdafFunction-Single'
    ScpFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/ScpFunction-Single'
    NefFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NefFunction-Single'

    ExternalAmfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/ExternalAmfFunction-Single'
    ExternalNrfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/ExternalNrfFunction-Single'
    ExternalNssfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/ExternalNssfFunction-Single'
    ExternalSeppFunction-Nultiple:
      type: array
      items:
        $ref: '#/components/schemas/ExternalSeppFunction-Single'

    AmfSet-Multiple:
```

```
    type: array
    items:
      $ref: '#/components/schemas/AmfSet-Single'
  AmfRegion-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/AmfRegion-Single'

  EP_N2-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N2-Single'
  EP_N3-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N3-Single'
  EP_N4-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N4-Single'
  EP_N5-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N5-Single'
  EP_N6-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N6-Single'
  EP_N7-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N7-Single'
  EP_N8-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N8-Single'
  EP_N9-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N9-Single'
  EP_N10-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N10-Single'
  EP_N11-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N11-Single'
  EP_N12-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N12-Single'
  EP_N13-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N13-Single'
  EP_N14-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N14-Single'
  EP_N15-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N15-Single'
  EP_N16-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N16-Single'
  EP_N17-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N17-Single'

  EP_N20-Multiple:
    type: array
    items:
      $ref: '#/components/schemas/EP_N20-Single'
  EP_N21-Multiple:
```

```
      type: array
      items:
        $ref: '#/components/schemas/EP_N21-Single'
    EP_N22-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_N22-Single'

    EP_N26-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_N26-Single'
    EP_N27-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_N27-Single'

    EP_N31-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_N31-Single'
    EP_N32-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_N32-Single'

    EP_S5C-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_S5C-Single'
    EP_S5U-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_S5U-Single'
    EP_Rx-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_Rx-Single'
    EP_MAP_SMSC-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_MAP_SMSC-Single'
    EP_NLS-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_NLS-Single'
    EP_NLG-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_NLG-Single'
    Configurable5QISet-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/Configurable5QISet-Single'


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

    resources-5gcNrm:
      oneOf:
       - $ref: '#/components/schemas/SubNetwork-Single'
       - $ref: '#/components/schemas/ManagedElement-Single'
       - $ref: '#/components/schemas/AmfFunction-Single'
       - $ref: '#/components/schemas/SmfFunction-Single'
       - $ref: '#/components/schemas/UpfFunction-Single'
       - $ref: '#/components/schemas/N3iwfFunction-Single'
       - $ref: '#/components/schemas/PcfFunction-Single'
       - $ref: '#/components/schemas/AusfFunction-Single'
       - $ref: '#/components/schemas/UdmFunction-Single'
       - $ref: '#/components/schemas/UdrFunction-Single'
       - $ref: '#/components/schemas/UdsfFunction-Single'
       - $ref: '#/components/schemas/NrfFunction-Single'
       - $ref: '#/components/schemas/NssfFunction-Single'
       - $ref: '#/components/schemas/SmsfFunction-Single'
       - $ref: '#/components/schemas/LmfFunction-Single'
       - $ref: '#/components/schemas/NgeirFunction-Single'
       - $ref: '#/components/schemas/SeppFunction-Single'
       - $ref: '#/components/schemas/NwdafFunction-Single'
```

```
    - $ref: '#/components/schemas/ScpFunction-Single'
    - $ref: '#/components/schemas/NefFunction-Single'

    - $ref: '#/components/schemas/ExternalAmfFunction-Single'
    - $ref: '#/components/schemas/ExternalNrfFunction-Single'
    - $ref: '#/components/schemas/ExternalNssfFunction-Single'
    - $ref: '#/components/schemas/ExternalSeppFunction-Single'

    - $ref: '#/components/schemas/AmfSet-Single'
    - $ref: '#/components/schemas/AmfRegion-Single'
    - $ref: '#/components/schemas/QFQoSMonitoringControl-Single'
    - $ref: '#/components/schemas/GtpUPathQoSMonitoringControl-Single'

    - $ref: '#/components/schemas/EP_N2-Single'
    - $ref: '#/components/schemas/EP_N3-Single'
    - $ref: '#/components/schemas/EP_N4-Single'
    - $ref: '#/components/schemas/EP_N5-Single'
    - $ref: '#/components/schemas/EP_N6-Single'
    - $ref: '#/components/schemas/EP_N7-Single'
    - $ref: '#/components/schemas/EP_N8-Single'
    - $ref: '#/components/schemas/EP_N9-Single'
    - $ref: '#/components/schemas/EP_N10-Single'
    - $ref: '#/components/schemas/EP_N11-Single'
    - $ref: '#/components/schemas/EP_N12-Single'
    - $ref: '#/components/schemas/EP_N13-Single'
    - $ref: '#/components/schemas/EP_N14-Single'
    - $ref: '#/components/schemas/EP_N15-Single'
    - $ref: '#/components/schemas/EP_N16-Single'
    - $ref: '#/components/schemas/EP_N17-Single'

    - $ref: '#/components/schemas/EP_N20-Single'
    - $ref: '#/components/schemas/EP_N21-Single'
    - $ref: '#/components/schemas/EP_N22-Single'

    - $ref: '#/components/schemas/EP_N26-Single'
    - $ref: '#/components/schemas/EP_N27-Single'

    - $ref: '#/components/schemas/EP_N31-Single'
    - $ref: '#/components/schemas/EP_N31-Single'

    - $ref: '#/components/schemas/EP_S5C-Single'
    - $ref: '#/components/schemas/EP_S5U-Single'
    - $ref: '#/components/schemas/EP_Rx-Single'
    - $ref: '#/components/schemas/EP_MAP_SMSC-Single'
    - $ref: '#/components/schemas/EP_NLS-Single'
    - $ref: '#/components/schemas/EP_NLG-Single'
    - $ref: '#/components/schemas/Configurable5QISet-Single'
    - $ref: '#/components/schemas/FiveQiDscpMappingSet-Single'
```

Annex H (normative): YANG definitions for 5GC

H.1 General

This annex contains the YANG definitions for the 5GC NRM, in accordance with 5GC information model definitions specified in clause 4.

H.2 Void

H.3 Void

H.4 Void

H.5 Modules

H.5.1 module _3gpp-5gc-common-yang-types@2019-10-20.yang

```
module _3gpp-5g-common-yang-types {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-5g-common-yang-types";
  prefix "types5g3gpp";


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

  organization "3GPP SA5";
  description "The model defines common types for 5G networks and
    network slicing.";
  reference "3GPP TS 28.541";

  revision 2019-10-20 {
    description "Initial version.";
    reference "Based on
      3GPP TS 28.541 V16.X.XX";
  }

  typedef CommModelType {
    reference "3GPP TS 23501";
    type enumeration {
      enum DIRECT_COMMUNICATION_WO_NRF {
        value 0;
        description "Directly communicate to other pre-configured NF service.";
      }

      enum DIRECT_COMMUNICATION_WITH_NRF {
        value 1;
        description "Directly communicate to other NF service discovered by NRF.";
      }

      enum INDIRECT_COMMUNICATION_WO_DEDICATED_DISCOVERY {
        value 2;
        description "Communicate to pre-configured other NF service through SCP as a proxy.";
      }

      enum INDIRECT_COMMUNICATION_WITH_DEDICATED_DISCOVERY {
        value 3;
        description "Communication to NF service discovered by NRF through SCP as a proxy.";
      }
```

```
    }
  }

  grouping CommModel {
    leaf groupId {
      type uint16;
    }
    leaf commModelType {
       type CommModelType;
    }
    leaf-list targetNFServiceList {

      type types3gpp:DistinguishedName;
    }
    leaf commModelConfiguration {
       type string;
    }
  }

  grouping SupportedFunc {
    leaf function {
      type string;
    }
    leaf policy {
       type string;
    }
  }

}
```

H.5.1a module _3gpp-5gc-nrm-affunction@2019-10-28.yang

```
module _3gpp-5gc-nrm-affunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-affunction;
  prefix af3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC is defined only to describe the IOCs representing
               its interaction interface with 5GC (i.e. EP_Rx and EP_N5).
               It has no attributes defined.";
  reference "3GPP TS 28.541";

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

  revision 2019-05-15 {
    description "initial revision";
  }

  grouping AFFunctionGrp {
    uses mf3gpp:ManagedFunctionGrp;
  }

  augment "/me3gpp:ManagedElement" {
    list AFFunction {
      description "5G Core AF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses AFFunctionGrp;
      }
    }
  }
}
```

H.5.2 module _3gpp-5gc-nrm-amffunction@2019-10-25.yang

```
module _3gpp-5gc-nrm-amffunction {
```

```
  yang-version 1.1;
  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-amffunction;
  prefix amf3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import ietf-inet-types { prefix inet; }
  import _3gpp-common-top { prefix top3gpp; }

  description "AMFFunction derived from basic ManagedFunction.";

  revision 2019-10-25 { reference "S5-194457 S5-193518"; }

  revision 2019-05-31 {
      description "Ericsson refactoring.";
  }

  revision 2018-08-07 {
      description "Initial revision";
  }

  grouping AMFFunctionGrp {
    uses mf3gpp:ManagedFunctionGrp;

    list pLMNIdList {
      min-elements 1;
      description "A list of PLMN identifiers (Mobile Country Code and Mobile Network Code).";
      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;
    }

    leaf sBIFQDN {
      description "The FQDN of the registered NF instance in the service-based interface.";
      type inet:domain-name;
    }

    leaf-list sNSSAIList {
      min-elements 0;  // conditionally mandatory if network slicing feature is supported
      description "List of S-NSSAIs the managed object is capable of supporting.
                  (Single Network Slice Selection Assistance Information)
                  An S-NSSAI has an SST (Slice/Service type) and an optional SD
                 (Slice Differentiator) field.";
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
    }

    list commModelList {
      min-elements 1;
      key "groupId";
      uses types5g3gpp:CommModel;
    }

  }

  augment "/me3gpp:ManagedElement" {
    list AMFFunction {
      description "5G Core AMF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses AMFFunctionGrp;
      }
```

```
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.3 module _3gpp-5gc-nrm-amfregion@2019-10-28.yang

```
module _3gpp-5gc-nrm-amfregion {
  yang-version 1.1;
  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-amfregion;
  prefix amfr3gpp;

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }

  description "This IOC represents the AMF Region which consists one or multiple AMF Sets.";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-11 {
    description "Ericsson refactoring.";
  }

  grouping AMFRegionGrp {
    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;
    }

    leaf-list nRTACList {
      description "List of Tracking Area Codes (legacy TAC or extended TAC)
                   where the represented management function is serving.";
                   reference "TS 38.413 clause 9.3.3.10";
      min-elements 1;
      config false;
      type types3gpp:Tac;
    }

    leaf-list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                  (Slice Differentiator) field.";
      //conditional support only if the network slicing feature is supported.
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    leaf aMFRegionId {
      description "Represents the AMF Region ID, which identifies the region.";
      mandatory true;
      type types3gpp:AmfRegionId;
    }

    leaf-list aMFSet {
      description "The AMFSet that the AFMRegion is associated with.";
      min-elements 1;
      type instance-identifier;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    list AMFRegion {
      description "5G Core AMFRegion IOC";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
```

```
      container attributes {
        uses AMFRegionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.4 module _3gpp-5gc-nrm-amfset@2019-10-28.yang

```
module _3gpp-5gc-nrm-amfset {
  yang-version 1.1;
  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-amfset;
  prefix amfset3gpp;

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }

  description "This IOC represents the AMF Set which consists of some AMFs that serve a given area
and Network Slice.";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-11 {
    description "Ericsson refactoring.";
  }

  grouping AMFSetGrp {
    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;
    }

    leaf-list nRTACList {
      description "List of Tracking Area Codes (legacy TAC or extended TAC)
                   where the represented management function is serving.";
                   reference "TS 38.413 clause 9.3.3.10";
      min-elements 1;
      config false;
      type types3gpp:Tac;
    }

    leaf-list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                  (Slice Differentiator) field.";
      //conditional support only if the network slicing feature is supported.
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    leaf aMFRegion {
      description "The AMFRegion that the AFMSet is associated with.";
      type instance-identifier;
    }

    leaf-list aMFSetMemberList {
      description "List of DNs of AMFFunction instances of the AMFSet.";
      min-elements 1;
      max-elements 1;
      type types3gpp:DistinguishedName;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    list AMFSet {
```

```
      description "5G Core AMFSet IOC";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses AMFSetGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.5 module _3gpp-5gc-nrm-ausffunction@2019-10-25.yang

```
module _3gpp-5gc-nrm-ausffunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-ausffunction;
  prefix ausf3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import ietf-inet-types { prefix inet; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the AUSF function in 5GC. For more information about the AUSF,
see 3GPP TS 23.501.";
  reference "3GPP TS 28.541";


  revision 2019-10-25 { reference "S5-194457 S5-193518"; }

  revision 2019-05-22 {
    description "initial revision";
  }

  grouping AUSFFuntionGrp {
    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;
    }

    leaf sBIFQDN {
      description "The FQDN of the registered NF instance in the service-based interface.";
      type inet:domain-name;
    }

    leaf-list  sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                   (Slice Differentiator) field.";
      //optional support
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
    }


    list commModelList {
```

```
      min-elements 1;
      key "groupId";
      uses types5g3gpp:CommModel;
    }
  }

  augment "/me3gpp:ManagedElement" {
    list AUSFFunction {
      description "5G Core AUSF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses AUSFFuntionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.6 module _3gpp-5gc-nrm-dnfunction@2019-10-28.yang

```
module _3gpp-5gc-nrm-dnfunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5_3gpp-5gc-nrm-dnfunction;
  prefix dn3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC is defined only to describe the IOCs representing
               Data Network (DN) interaction interface with 5GC (i.e. EP_N6).
               It has no attributes defined.";
  reference "3GPP TS 28.541";

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

  revision 2019-05-15 {
    description "initial revision";
  }

  grouping DNFunctionGrp {
    uses mf3gpp:ManagedFunctionGrp;
  }

  augment "/me3gpp:ManagedElement" {
    list DNFunction {
      description "5G Core DN Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses DNFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.7 module _3gpp-5gc-nrm-ep@2019-11-18.yang

```
module _3gpp-5gc-nrm-ep {
  yang-version 1.1;
  namespace "urn:3gpp:tsg:sa5:nrm:_3gpp-5gc-nrm-ep";
  prefix "cep3gpp";

  import _3gpp-common-ep-rp { prefix eprp3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-5gc-nrm-affunction { prefix af3gpp; }
  import _3gpp-5gc-nrm-amffunction { prefix amf3gpp; }
  import _3gpp-5gc-nrm-ausffunction { prefix ausf3gpp; }
  import _3gpp-5gc-nrm-dnfunction { prefix dn3gpp; }
  import _3gpp-5gc-nrm-lmffunction { prefix lmf3gpp; }
```

```
  import _3gpp-5gc-nrm-n3iwffunction { prefix n3iwf3gpp; }
  import _3gpp-5gc-nrm-ngeirfunction { prefix ngeir3gpp; }
  import _3gpp-5gc-nrm-nrffunction { prefix nrf3gpp; }
  import _3gpp-5gc-nrm-nssffunction { prefix nssf3gpp; }
  import _3gpp-5gc-nrm-pcffunction { prefix pcf3gpp; }
  import _3gpp-5gc-nrm-seppfunction { prefix sepp3gpp; }
  import _3gpp-5gc-nrm-smffunction { prefix smf3gpp; }
  import _3gpp-5gc-nrm-smsffunction { prefix smsf3gpp; }
  import _3gpp-5gc-nrm-udmfunction { prefix udm3gpp; }
  import _3gpp-5gc-nrm-upffunction { prefix upf3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import ietf-inet-types { prefix inet; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the 5GC related endpoint
               Information Object Classes (IOCs) that are part of the 5G Core
               Network Resource Model.";
  reference "3GPP TS 28.541";

  revision 2019-11-18 {
    description "Ericsson refactoring.";
  }

  revision 2018-07-31 {
    description "Initial revision";
  }

  grouping EP_N2Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N3Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N4Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N5Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N6Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N7Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N8Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N9Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N10Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N11Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N12Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N13Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N14Grp {
    uses eprp3gpp:EP_Common;
```

```
  }

  grouping EP_N15Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N16Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N17Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N20Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N21Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N22Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N26Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N27Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N31Grp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_N32Grp {
    uses eprp3gpp:EP_Common;
    container remotePlmnId {
      description "PLMN Identifiers of the remote sepp.
                   The PLMN Identifier is composed of a Mobile Country Code (MCC) and a Mobile
Network Code (MNC).";
      uses types3gpp:PLMNId;
    }

    leaf remoteSeppAddress {
      description "The host address of the SEPP.";
      type inet:host;
    }

    leaf remoteSeppId {
      type uint16;
    }

    leaf n32cParas {
      type string;
    }

    leaf n32fPolicy {
      type string;
    }

    leaf withIPX {
      type boolean;
    }
  }

  grouping EP_S5CGrp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_S5UGrp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_RxGrp {
```

```
    uses eprp3gpp:EP_Common;
  }

  grouping EP_MAP_SMSCGrp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_NLSGrp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_NLGGrp {
    uses eprp3gpp:EP_Common;
  }

  grouping EP_SBI_IPXGrp {
    uses eprp3gpp:EP_Common;
    leaf-list sBIService {
      min-elements 1;
      config false;
      type string;
    }
  }

  augment "/me3gpp:ManagedElement/af3gpp:AFFunction" {
    list EP_N6 {
      description "Represents the EP_N6 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N6Grp;
      }
    }

    list EP_Rx {
      description "Represents the EP_Rx IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_RxGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/amf3gpp:AMFFunction" {
    list EP_N2 {
      description "Represents the EP_N2 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N2Grp;
      }
    }

    list EP_N8 {
      description "Represents the EP_N8 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N8Grp;
      }
    }

    list EP_N11 {
      description "Represents the EP_N11 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N11Grp;
      }
    }

    list EP_N12 {
      description "Represents the EP_N12 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N12Grp;
```

```
    }
  }

  list EP_N14 {
    description "Represents the EP_N14 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N14Grp;
    }
  }

  list EP_N15 {
    description "Represents the EP_N15 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N15Grp;
    }
  }

  list EP_N17 {
    description "Represents the EP_N17 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N17Grp;
    }
  }

  list EP_N20 {
    description "Represents the EP_N20 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N20Grp;
    }
  }

  list EP_N22 {
    description "Represents the EP_N22 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N22Grp;
    }
  }

  list EP_N26 {
    description "Represents the EP_N26 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N26Grp;
    }
  }

  list EP_NLS {
    description "Represents the EP_NLS IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_NLSGrp;
    }
  }

  list EP_NLG {
    description "Represents the EP_NLG IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_NLGGrp;
    }
  }
}

augment "/me3gpp:ManagedElement/ausf3gpp:AUSFFunction" {
  list EP_N12 {
```

```
    description "Represents the EP_N12 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N12Grp;
    }
  }

  list EP_N13 {
    description "Represents the EP_N13 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N13Grp;
    }
  }
}

augment "/me3gpp:ManagedElement/dn3gpp:DNFunction" {
  list EP_N6 {
    description "Represents the EP_N6 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N6Grp;
    }
  }
}

augment "/me3gpp:ManagedElement/lmf3gpp:LMFFunction" {
  list EP_NLS {
    description "Represents the EP_NLS IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_NLSGrp;
    }
  }
}

augment "/me3gpp:ManagedElement/n3iwf3gpp:N3IWFFunction" {
  list EP_N2 {
    description "Represents the EP_N2 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N2Grp;
    }
  }

  list EP_N3 {
    description "Represents the EP_N3 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N3Grp;
    }
  }
}

augment "/me3gpp:ManagedElement/ngeir3gpp:NGEIRFunction" {
  list EP_N17 {
    description "Represents the EP_N17 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N17Grp;
    }
  }
}

augment "/me3gpp:ManagedElement/nrf3gpp:NRFFunction" {
  list EP_N27 {
    description "Represents the EP_N27 IOC.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EP_N26Grp;
```

```
      }
    }

  }

  augment "/me3gpp:ManagedElement/nssf3gpp:NSSFFunction" {
    list EP_N22 {
      description "Represents the EP_N22 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N22Grp;
      }
    }

    list EP_N31 {
      description "Represents the EP_N31 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N31Grp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/pcf3gpp:PCFFunction" {
    list EP_N5 {
      description "Represents the EP_N5 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N5Grp;
      }
    }

    list EP_N7 {
      description "Represents the EP_N7 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N7Grp;
      }
    }

    list EP_N15 {
      description "Represents the EP_N15 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N15Grp;
      }
    }

    list EP_N16 {
      description "Represents the EP_N16 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N16Grp;
      }
    }

    list EP_Rx {
      description "Represents the EP_Rx IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_RxGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/sepp3gpp:SEPPFunction" {
    list EP_N32 {
      description "Represents the EP_N32 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
```

```
        uses EP_N32Grp;
      }
    }

}
 augment "/me3gpp:ManagedElement/smsf3gpp:SMSFFunction" {
    list EP_N20 {
      description "Represents the EP_20 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N20Grp;
      }
    }

    list EP_N21 {
      description "Represents the EP_N21 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N21Grp;
      }
    }

    list EP_MAP_SMSC {
      description "Represents the EP_MAP_SMSC IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_MAP_SMSCGrp;
      }
    }
 }

 augment "/me3gpp:ManagedElement/smf3gpp:SMFFunction" {
    list EP_N4 {
      description "Represents the EP_N4 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N4Grp;
      }
    }

    list EP_N7 {
      description "Represents the EP_N7 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N7Grp;
      }
    }

    list EP_N10 {
      description "Represents the EP_N10 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N10Grp;
      }
    }

    list EP_N11 {
      description "Represents the EP_N11 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N11Grp;
      }
    }

    list EP_N16 {
      description "Represents the EP_N16 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N16Grp;
      }
```

```
    }

    list EP_S5C {
    description "Represents the EP_S5C IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_S5CGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/udm3gpp:UDMFunction" {
    list EP_N8 {
      description "Represents the EP_N8 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N8Grp;
      }
    }

    list EP_N10 {
      description "Represents the EP_N10 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N10Grp;
      }
    }

    list EP_N13 {
      description "Represents the EP_N13 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N13Grp;
      }
    }

  }

  augment "/me3gpp:ManagedElement/upf3gpp:UPFFunction" {
    list EP_N4 {
      description "Represents the EP_N4 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N4Grp;
      }
    }

    list EP_N3 {
      description "Represents the EP_N3 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N3Grp;
      }
    }

    list EP_N9 {
      description "Represents the EP_N9 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N9Grp;
      }
    }

    list EP_S5U {
      description "Represents the EP_S5U IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_S5UGrp;
      }
    }
```

```
    list EP_EP_N6 {
      description "Represents the EP_N6 IOC.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_N6Grp;
      }
    }
  }
}
```

H.5.8 module _3gpp-5gc-nrm-externalnrffunction@2019-10-28.yang

```
module _3gpp-5gc-nrm-externalnrffunction {
  yang-version 1.1;
  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-externalnrffunction;
  prefix extnrf3gpp;

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }

  description "This IOC represents external NRF function controlled by another management domain.";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-11 {
    description "Ericsson refactoring.";
  }

  grouping ExternalNRFFunctionGrp {
    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;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    list ExternalNRFFunction {
      description "5G Core External NRF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalNRFFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;    }
  }
}
```

H.5.9 module _3gpp-5gc-nrm-externalnssffunction@2019-10-28.yang

```
module _3gpp-5gc-nrm-externalnssffunction {
  yang-version 1.1;
  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-externalnssffunction;
  prefix extnssf3gpp;

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }

  description "This IOC represents external NSSF function controlled by another management domain.";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-11 {
```

```
    description "Ericsson refactoring.";
  }

  grouping ExternalNSSFFunctionGrp {
    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;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    list ExternalNSSFFunction {
      description "5G Core External NSSF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalNSSFFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.10 module _3gpp-5gc-nrm-lmffunction@2019-10-25.yang

```
module _3gpp-5gc-nrm-lmffunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-lmffunction;
  prefix lmf3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the LMF function defined in 3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-10-25 { reference "S5-194457 S5193518"; }

  revision 2019-05-15 {
    description "initial revision";
    reference "Based on
      3GPP TS 28.541 V15.X.XX";
  }

  grouping LMFFunctionGrp {
    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;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
```

```
    }

    list commModelList {
      min-elements 1;
      key "groupId";
      uses types5g3gpp:CommModel;
    }
  }

  augment "/me3gpp:ManagedElement" {
    list LMFFunction {
      description "5G Core LMF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses LMFFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.11 module _3gpp-5gc-nrm-n3iwffunction@2019-10-28.yang

```
module _3gpp-5gc-nrm-n3iwffunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-n3iwffunction;
  prefix n3iwf3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the N3IWF function which is used to enable non-3GPP
               access networks connected to the 5GC. For more information about the N3IWF, see 3GPP
TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-05-22 {
    description "initial revision";
  }

  grouping N3IWFFunctionGrp {
    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;
    }

    list commModelList {
      min-elements 1;
      key "groupId";
      uses types5g3gpp:CommModel;
    }
  }

  augment "/me3gpp:ManagedElement" {
    list N3IWFFunction {
      description "5G Core N3IWF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
```

```
        uses N3IWFFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.12 module _3gpp-5gc-nrm-nfprofile@2019-06-17.yang

```
module _3gpp-5gc-nrm-nfprofile {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-nfprofile;
  prefix nfp3gpp;

  import _3gpp-common-yang-types { prefix types3gpp; }
  import ietf-inet-types { prefix inet; }
  import ietf-yang-types { prefix yang; }
  import _3gpp-5gc-nrm-nfservice { prefix nfs3gpp; }

  organization "3gpp SA5";
  description "NF profile class.";
  reference "3GPP TS 29.510";

  revision 2019-06-17 {
    description "initial revision";
  }

  grouping NFProfileGrp {
    leaf nfInstanceID {
      description "String uniquely identifying a NF instance.";
      mandatory true;
      type string;
    }

    leaf nfType {
      description "Type of Network Function.";
      mandatory true;
      type types3gpp:NfType;
    }

    leaf nfStatus {
      description "Status of the NF Instance.";
      mandatory true;
      type NFStatus;
    }

    leaf heartBeatTimer {
      description "Time in seconds expected between 2 consecutive heart-beat messages from
                   an NF Instance to the NRF. It may be included in the registration request.
                   When present in the request it shall contain the heartbeat time proposed by the
NF service consumer.";
      //conditional support
      type uint16;
    }

    list plmnList {
      description "PLMN(s) of the Network Function.
                  This IE shall be present if this information is available for the NF.
                  If not provided, PLMN ID(s) of the PLMN of the NRF are assumed for the NF.";

      //conditional support
      min-elements 1;
      key "mcc mnc";
      uses types3gpp:PLMNId;
    }

    list sNssais { //is the key unique
      description "S-NSSAIs of the Network Function. If not provided, the NF can serve any S-NSSAI.
                   When present this IE represents the list of S-NSSAIs supported in all the PLMNs
listed in the plmnList IE.";
      min-elements 1;
      //optional support
      key "sst sd";
      uses Snssai;
    }
```

```
    list perPlmnSnssaiList {
      description "This IE may be included when the list of S-NSSAIs supported by the NF for each
PLMN it is supporting is different.
                   When present, this IE shall include the S-NSSAIs supported by the Network
Function
                   for each PLMN supported by the Network Function. When present, this IE shall
override sNssais IE.";
      min-elements 1;
      //optional support
      key idx; //no obvious leaf to use as a key
      leaf idx { type uint32; }
      uses PlmnSnssai;
    }

    leaf-list nsiList {
      description "NSI identities of the Network Function.
                   If not provided, the NF can serve any NSI.";
      //optional support
      min-elements 1;
      type string;
    }

    leaf fqdn {
      description "FQDN of the Network Function. For AMF, the FQDN registered with the NRF
                   shall be that of the AMF Name.";
      //conditional support
      type inet:domain-name;
    }

    leaf interPlmnFqdn {
      description "If the NF needs to be discoverable by other NFs in a different PLMN,
                   then an FQDN that is used for inter-PLMN routing is specified.";
      //conditional support
      type inet:domain-name;
    }

    leaf-list ipv4Addresses {
      description "IPv4 address(es) of the Network Function.";
      min-elements 1;
      //conditional support
      type inet:ipv4-address;
    }

    leaf-list ipv6Addresses {
      description "IPv6 address(es) of the Network Function.";
      min-elements 1;
      //conditional support
      type inet:ipv6-address;
    }

    list allowedPlmns {
      description "PLMNs allowed to access the NF instance.
                   If not provided, any PLMN is allowed to access the NF.";

      min-elements 1;
      //optional support
      key "mcc mnc";
      uses types3gpp:PLMNId;
    }

    leaf-list allowedNfTypes {
      description "Type of the NFs allowed to access the NF instance.
                   If not provided, any NF type is allowed to access the NF.";
      min-elements 1;
      //optional support
      type types3gpp:NfType;
    }

    leaf-list allowedNfDomains {
      description "Pattern representing the NF domain names allowed to access the NF instance.
                   If not provided, any NF domain is allowed to access the NF.";
      min-elements 1;
      //optional support
      type string;
    }

    list allowedNssais { //is the key unique
      description "S-NSSAI of the allowed slices to access the NF instance.
```

```
                  If not provided, any slice is allowed to access the NF.";
      min-elements 1;
      //optional support
      key "sst sd";
      uses Snssai;
    }

    leaf priority {
      description "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. The NRF may overwrite the received
priority value when exposing
                  an NFProfile with the Nnrf_NFDiscovery service.";
      //optional support
      type uint16;
    }

    leaf capacity {
      description "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.";
      //optional support
      type uint16;
    }

    leaf load {
      description "Dynamic load information, ranged from 0 to 100, indicates the current load
percentage of the NF.";
      //optional support
      type types3gpp:Load;
    }

    leaf locality {
      description "Operator defined information about the location of the NF instance (e.g.
geographic location, data center).";
      //optional support
      type string;
    }

    grouping udrInfo {
      //optional support

      leaf groupId {
        description "Identity of the UDR group that is served by the UDR instance.
                     If not provided, the UDR instance does not pertain to any UDR group.";
        //optional support
        type string;
      }

      list supiRanges {
        description "List of ranges of SUPI's whose profile data is available in the UDR instance.";
        key "start end pattern";
        min-elements 1;
        //optional support
        uses SupiRange;
      }

      list gpsiRanges {
        description "List of ranges of GPSIs whose profile data is available in the UDR instance.";
        key "start end pattern";
        min-elements 1;
        //optional support
        uses IdentityRange;
      }

      list externalGroupIdentifiersRanges {
        description "List of ranges of external groups whose profile data is available in the UDR
instance.";
        key "start end pattern";
        min-elements 1;
        //optional support
        uses IdentityRange;
      }

      leaf-list supportedDataSets {
        description "List of supported data sets in the UDR instance.
```

```
                    If not provided, the UDR supports all data sets.";
        min-elements 1;
        //optional support
        type DataSetId;
      }
    }

    grouping udmInfo {
      //optional support

      leaf groupId {
        description "Identity of the UDM group that is served by the UDM instance.
                    If not provided, the UDM instance does not pertain to any UDM group.";
        //optional support
        type string;
      }

      list supiRanges {
        description "List of ranges of SUPI's whose profile data is available in the UDM instance.";
        key "start end pattern";
        min-elements 1;
        //optional support
        uses SupiRange;
      }

      list gpsiRanges {
        description "List of ranges of GPSIs whose profile data is available in the UDM instance.";
        key "start end pattern";
        min-elements 1;
        //optional support
        uses IdentityRange;
      }

      list externalGroupIdentifiersRanges {
        description "List of ranges of external groups whose profile data is available in the UDM
instance.";
        key "start end pattern";
        min-elements 1;
        //optional support
        uses IdentityRange;
      }

      leaf-list routingIndicators {
        description "List of Routing Indicator information that allows to route network signalling
with SUCI
                    to the UDM instance. If not provided, the UDM can serve any Routing Indicator.
                    Pattern: '^[0-9]{1,4}$'.";
        //optional support
        min-elements 1;
        type string;
      }
    }

    grouping ausfInfo {
      //optional support

      leaf groupId {
        description "Identity of the AUSF group. If not provided, the AUSF instance does not pertain
to any AUSF group.";
        //optional support
        type string;
      }

      list supiRanges {
        description "List of ranges of SUPIs that can be served by the AUSF instance. If not
provided, the AUSF can serve any SUPI.";
        key "start end pattern";
        min-elements 1;
        //optional support
        uses SupiRange;
      }

      leaf-list routingIndicators {
        description "List of Routing Indicator information that allows to route network signalling
with SUCI
                    to the AUSF instance. If not provided, the AUSF can serve any Routing
Indicator.
                    Pattern: '^[0-9]{1,4}$'.";
```

```
        //optional support
        min-elements 1;
        type string;
      }
    }

    grouping amfInfo {
      //optional support

      leaf amfRegionId {
        description "AMF region identifier";
        type string;
      }

      leaf amfSetId {
        description "AMF set identifier";
        type string;
      }

      list guamiList {
        description "List of supported GUAMIs.";

        key idx; //no obvious leaf to use as a key
        leaf idx { type uint32; }

        min-elements 1;
        uses Guami;
      }

      list taiList {
        description "The list of TAIs the AMF can serve. It may contain the non-3GPP access TAI.
                     The absence of this attribute and the taiRangeList attribute indicate that
                     the AMF can be selected for any TAI in the serving network.";

        key idx; //no obvious leaf to use as a key
        leaf idx { type uint32; }

        //optional support
        min-elements 1;
        uses Tai;
      }

      list taiRangeList {
        description "The range of TAIs the AMF can serve. The absence of this attribute and the
taiList
                     attribute indicate that the AMF can be selected for any TAI in the serving
network.";
        //optional support
        min-elements 1;
        key idx; //no obvious leaf to use as a key
        leaf idx { type uint32; }
        uses TaiRange;
      }

      list backupInfoAmfFailure {
        description "List of GUAMIs for which the AMF acts as a backup for AMF failure.";

        key idx; //no obvious leaf to use as a key
        leaf idx { type uint32; }

        //optional support
        min-elements 1;
        uses Guami;
      }

      list backupInfoAmfRemoval {
        description "List of GUAMIs for which the AMF acts as a backup for planned AMF removal.";

        key idx; //no obvious leaf to use as a key
        leaf idx { type uint32; }

        //optional support
        min-elements 1;
        uses Guami;
      }

      list n2InterfaceAmfInfo {
```

```
        description "N2 interface information of the AMF. This information needs not be sent in NF
Discovery responses.
                     It may be used by the NRF to update the DNS for AMF discovery by the 5G Access
Network.";

        //optional support
        max-elements 1;
        key idx; //no obvious leaf to use as a key
        leaf idx { type uint32; }
        uses N2InterfaceAmfInfo;
      }
    }

    grouping smfInfo {
      //optional support

      list sNssaiSmfInfoList {
        description "List of parameters supported by the SMF per S-NSSAI.";
        min-elements 1;
        key idx; //no obvious leaf to use as a key
        leaf idx { type uint32; }
        uses sNssaiSmfInfoItem;
      }

      list taiList {
        description "The list of TAIs the SMF can serve. It may contain the non-3GPP access TAI.
                     The absence of this attribute and the taiRangeList attribute indicate that
                     the SMF can be selected for any TAI in the serving network.";

        key idx; //no obvious leaf to use as a key
        leaf idx { type uint32; }

        //optional support
        min-elements 1;
        uses Tai;
      }

      list taiRangeList {
        description "The range of TAIs the SMF can serve. The absence of this attribute and the
taiList
                     attribute indicate that the SMF can be selected for any TAI in the serving
network.";
        //optional support
        min-elements 1;
        key idx; //no obvious leaf to use as a key
        leaf idx { type uint32; }
        uses TaiRange;
      }

      leaf pgwFqdn {
        description "The FQDN of the PGW if the SMF is a combined SMF/PGW-C.";
        //optional support
        type inet:domain-name;
      }

      leaf-list accessType {
        description "If included, this IE shall contain the access type (3GPP_ACCESS and/or
NON_3GPP_ACCESS) supported by the SMF.
                     If not included, it shall be assumed the both access types are supported.";

        //conditional support
        min-elements 1;
        max-elements 2;
        type AccessType;
      }
    }

    grouping upfInfo {
      //optional support

      list sNssaiUpfInfoList {
        description "List of parameters supported by the UPF per S-NSSAI.";
        min-elements 1;
        key idx; //no obvious leaf to use as a key
        leaf idx { type uint32; }
        uses SnssaiUpfInfoItem;
      }
```

```
      leaf-list smfServingArea {
        description "The SMF service area(s) the UPF can serve.
                     If not provided, the UPF can serve any SMF service area.";

        //optional support
        min-elements 1;
        type string;
      }

      list interfaceUpfInfo {
        description "List of User Plane interfaces configured on the UPF. When this IE is provided
in the NF Discovery response,
                     the NF Service Consumer (e.g. SMF) may use this information for UPF
selection.";

        key idx; //no obvious leaf to use as a key
        leaf idx { type uint32; }

        //optional support
        min-elements 1;
        uses InterfaceUpfInfoItem;
      }

      leaf iwkEpsInd {
        description "Indicates whether interworking with EPS is supported by the UPF.
                     true: Supported
                     false (default): Not Supported";

        //optional support
        type boolean;
      }

      leaf-list pduSessionTypes {
        description "List of PDU session type(s) supported by the UPF. The absence of this attribute
indicates that the UPF can be selected
                     for any PDU session type.";

        //optional support
        min-elements 1;
        type PduSessionType;
      }
    }

    grouping pcfInfo {
      //optional support

      leaf-list dnnList {
        description "DNNs supported by the PCF.
                     If not provided, the PCF can serve any DNN.";

        //optional support
        min-elements 1;
        type string;
      }

      list supiRanges {
        description "List of ranges of SUPIs that can be served by the PCF instance. If not
provided, the PCF can serve any SUPI.";
        key "start end pattern";
        min-elements 1;
        //optional support
        uses SupiRange;
      }

      leaf rxDiamHost {
        description "This IE shall be present if the PCF supports Rx interface.
                     When present, this IE shall indicate the Diameter host of the Rx interface for
the PCF.
                     Pattern: '^([A-Za-z0-9]+(-[A-Za-z0-9]+).)+[a-z]{2,}$'.";

        //conditional support
        type string;
      }

      leaf rxDiamRealm {
        description "This IE shall be present if the PCF supports Rx interface.
                     When present, this IE shall indicate the Diameter realm of the Rx interface for
the PCF.
```

```
                    Pattern: '^([A-Za-z0-9]+(-[A-Za-z0-9]+).)+[a-z]{2,}$'.";

        //conditional support
        type string;
      }
    }

    grouping bsfInfo {
      //optional support

      list ipv4AddressRanges {
        description "List of ranges of IPv4 addresses handled by BSF.
                     If not provided, the BSF can serve any IPv4 address.";
        //optional support
        key "start end";
        uses types3gpp:Ipv4AddressRange;
      }

      leaf-list dnnList {
        description "List of DNNs handled by the BSF
                     If not provided, the BSF can serve any DNN.";

        //optional support
        min-elements 1;
        type string;
      }

      leaf-list ipDomainList {
        description "List of IPv4 address domains, as described in subclause 6.2 of 3GPP TS 29.513,
handled by the BSF.
                     If not provided, the BSF can serve any IP domain.";
        //optional support
        min-elements 1;
        type string;
      }

      list ipv6PrefixRanges {
        description "List of ranges of IPv6 prefixes handled by the BSF.
                     If not provided, the BSF can serve any IPv6 prefix.";
        //optional support
        key "start end";
        uses types3gpp:Ipv6PrefixRange;
      }
    }

    grouping chfInfo {
      //optional support

      list supiRangeList {
        description "List of ranges of SUPIs that can be served by the CHF instance. If not
provided, the CHF can serve any SUPI.";
        key "start end pattern";
        min-elements 1;
        //optional support
        uses SupiRange;
      }

      list gpsiRangeList {
        description "List of ranges of GPSI that can be served by the CHF instance. If not provided,
the CHF can serve any GPSI.";
        key "start end pattern";
        min-elements 1;
        //optional support
        uses IdentityRange;
      }

      list plmnRangeList {
        description "List of ranges of PLMNs (including the PLMN IDs of the CHF instance) that can
be served by the CHF instance.
                     If not provided, the CHF can serve any PLMN.";

        min-elements 1;
        //optional support
        key "mcc mnc";
        uses types3gpp:PLMNId;
      }
    }
```

```
    grouping nrfInfoGrp {
      //optional support

      list servedUdrInfo {
        description "This attribute contains all the udrInfo attributes locally configured in the
NRF or the NRF received during NF registration.";
        //optional support

        key nfInstanceID;
        leaf nfInstanceID {
          description "String uniquely identifying a NF instance.";
          type string;
        }

        min-elements 1;
        uses udrInfo;
      }

      list servedUdmInfo {
        description "This attribute contains all the udmInfo attributes locally configured in the
NRF or the NRF received during NF registration.";
        //optional support

        key nfInstanceID;
        leaf nfInstanceID {
          description "String uniquely identifying a NF instance.";
          type string;
        }

        min-elements 1;
        uses udmInfo;
      }

      list servedAusfInfo {
        description "This attribute contains all the ausfInfo attributes locally configured in the
NRF or the NRF received during NF registration.";
        //optional support

        key nfInstanceID;
        leaf nfInstanceID {
          description "String uniquely identifying a NF instance.";
          type string;
        }

        min-elements 1;
        uses ausfInfo;
      }

      list servedAmfInfo {
        description "This attribute contains all the amfInfo attributes locally configured in the
NRF or the NRF received during NF registration.";
        //optional support

        key nfInstanceID;
        leaf nfInstanceID {
          description "String uniquely identifying a NF instance.";
          type string;
        }

        min-elements 1;
        uses amfInfo;
      }

      list servedSmfInfo {
        description "This attribute contains all the smfInfo attributes locally configured in the
NRF or the NRF received during NF registration.";
        //optional support

        key nfInstanceID;
        leaf nfInstanceID {
          description "String uniquely identifying a NF instance.";
          type string;
        }

        min-elements 1;
        uses smfInfo;
      }
```

```
      list servedUpfInfo {
        description "This attribute contains all the upfInfo attributes locally configured in the
NRF or the NRF received during NF registration.";
        //optional support

        key nfInstanceID;
        leaf nfInstanceID {
          description "String uniquely identifying a NF instance.";
          type string;
        }

        min-elements 1;
        uses upfInfo;
      }

      list servedPcfInfo {
       description "This attribute contains all the pcfInfo attributes locally configured in the NRF
or the NRF received during NF registration.";
        //optional support

        key nfInstanceID;
        leaf nfInstanceID {
          description "String uniquely identifying a NF instance.";
          type string;
        }

        min-elements 1;
        uses pcfInfo;
      }

      list servedBsfInfo {
       description "This attribute contains all the bsfInfo attributes locally configured in the NRF
or the NRF received during NF registration.";
        //optional support

        key nfInstanceID;
        leaf nfInstanceID {
          description "String uniquely identifying a NF instance.";
          type string;
        }

        min-elements 1;
        uses bsfInfo;
      }

      list servedChfInfo {
        description "This attribute contains all the bsfInfo attributes locally configured in the
NRF or the NRF received during NF registration.";
        //optional support

        key nfInstanceID;
        leaf nfInstanceID {
          description "String uniquely identifying a NF instance.";
          type string;
        }

        min-elements 1;
        uses chfInfo;
      }
    }

    list nrfInfo {
      key idx; //no obvious leaf to use as a key
      leaf idx { type uint32; }
      max-elements 1;
      uses nrfInfoGrp;
    }

    leaf customInfo {
      description "Specific data for custom Network Functions.";
      type string;
    }

    leaf recoveryTime {
      description "Timestamp when the NF was (re)started.";
      //optional support
      type yang:date-and-time;
    }
```

```
    leaf nfServicePersistence {
      description "If present, and set to true, it indicates that the different service instances of
a same NF Service in this NF instance,
                   supporting a same API version, are capable to persist their resource state in
shared storage and therefore these resources
                   are available after a new NF service instance supporting the same API version is
selected by a NF Service Consumer (see 3GPP TS 23.527).
                   Otherwise, it indicates that the NF Service Instances of a same NF Service are
not capable to share resource state inside the NF Instance.";

      //optional support
      type boolean;
    }

    list nfServices {
      description "List of NF Service Instances. It shall include the services produced by the NF
that can be discovered by other NFs.";
      key serviceInstanceID;
      //optional support
      min-elements 1;
      uses nfs3gpp:NFServiceGrp;
    }

    leaf nfProfileChangesSupportInd {
      description "NF Profile Changes Support Indicator. This IE may be present in the NFRegister or
NFUpdate (NF Profile Complete Replacement) request and shall be absent in the response.
                   true: the NF Service Consumer supports receiving NF Profile Changes in the
response.
                   false (default): the NF Service Consumer does not support receiving NF Profile
Changes in the response.";

      //optional support
      type boolean;
    }

    leaf nfProfileChangesInd {
      description "NF Profile Changes Indicator. This IE shall be absent in the request to the NRF
and may be included by the NRF in NFRegister or NFUpdate (NF Profile Complete Replacement) response.
                   true: the NF Profile contains NF Profile changes.
                   false (default): complete NF Profile.";

      //optional support
      type boolean;
    }

    list defaultNotificationSubscriptions {
      description "Notification endpoints for different notification types.";
      key notificationType;
      //optional support
      min-elements 1;
      uses types3gpp:DefaultNotificationSubscription;
    }
  }

  typedef NFStatus {
    type enumeration {
      enum REGISTERED;
      enum SUSPENDED;
    }
  }

  typedef DataSetId {
    type enumeration {
      enum SUBSCRIPTION;
      enum POLICY;
      enum EXPOSURE;
      enum APPLICATION;
    }
  }

  grouping SupiRange {
    leaf start {
      description "First value identifying the start of a SUPI range. To be used when the range of
SUPI's can be represented as a numeric range (e.g., IMSI ranges).";
      type string {
        pattern '^[0-9]+$';
      }
```

```
    }

    leaf end {
      description "Last value identifying the end of a SUPI range. To be used when the range of
SUPI's can be represented as a numeric range (e.g. IMSI ranges).";
      type string {
        pattern '^[0-9]+$';
      }
    }

    leaf pattern {
      description "Pattern representing the set of SUPI's belonging to this range.
                   A SUPI value is considered part of the range if and only if the SUPI string fully
matches the regular expression.";
      type string;
    }
  }

  grouping IdentityRange {
    leaf start {
      description "First value identifying the start of an identity range. To be used when the range
of identities can be represented as a numeric range (e.g., MSISDN ranges).";
      type string {
        pattern '^[0-9]+$';
      }
    }

    leaf end {
      description "Last value identifying the end of an identity range. To be used when the range of
identities can be represented as a numeric range (e.g. MSISDN ranges).";
      type string {
        pattern '^[0-9]+$';
      }
    }

    leaf pattern {
      description "Pattern representing the set of identities belonging to this range.
                   An identity value is considered part of the range if and only if the identity
string fully matches the regular expression.";
      type string;
    }
  }

  grouping TacRange {
    leaf start {
      description "First value identifying the start of a TAC range, to be used when the range of
TAC's can be represented as a hexadecimal range (e.g., TAC ranges).";
      type string {
        pattern '^([A-Fa-f0-9]{4}|[A-Fa-f0-9]{6}$)';
      }
    }

    leaf end {
      description "Last value identifying the end of a TAC range, to be used when the range of TAC's
can be represented as a hexadecimal range (e.g. TAC ranges).";
      type string {
        pattern '^([A-Fa-f0-9]{4}|[A-Fa-f0-9]{6})$';
      }
    }

    leaf pattern {
      description "Pattern representing the set of TAC's belonging to this range.";
      type string;
    }
  }

  grouping SnssaiUpfInfoItem {
    list sNssai { //is the key unique
      description "Supported S-NSSAI.";
      min-elements 1;
      max-elements 1;
      key "sst sd";
      uses Snssai;
    }

    list dnnUpfInfoList {
      description "List of parameters supported by the UPF per DNN.";
      min-elements 1;
```

```
      key dnn;
      uses DnnUpfInfoItem;
    }
  }

  grouping DnnUpfInfoItem {
    leaf dnn {
      description "String representing a Data Network.";
      mandatory true;
      type string;
    }

    leaf-list dnaiList {
      description "List of Data network access identifiers supported by the UPF for this DNN.
                   The absence of this attribute indicates that the UPF can be selected for this DNN
for any DNAI.";
      min-elements 1;
      type string; //dnai is the type but its only a string with desc: DNAI (Data network access
identifier), is this needed as its own typedef or string is ok
    }

    leaf-list pduSessionTypes {
      description "List of PDU session type(s) supported by the UPF for a specific DNN.";
      min-elements 1;
      type PduSessionType;
    }
  }

  grouping Snssai {
    leaf sst {
      description "Unsigned integer, within the range 0 to 255, representing the Slice/Service Type.
                   It indicates the expected Network Slice behaviour in terms of features and
services.";
      mandatory true;
      type uint32;
    }

    leaf sd {
      description "3-octet string, representing the Slice Differentiator, in hexadecimal
representation.";
      //optional
      type string {
        pattern '^[A-Fa-f0-9]{6}$';
      }
    }

    reference "3GPP TS 29.571";
  }

  typedef PduSessionType {
    type enumeration {
      enum IPV4;
      enum IPV6;
      enum IPV4V6;
      enum UNSTRUCTURED;
      enum ETHERNET;
    }
  }

  grouping Guami {
    list plmnId {
      description "PLMN Identity.";
      min-elements 1;
      max-elements 1;
      key "mcc mnc";
      uses types3gpp:PLMNId;
    }

    list amfId {
      description "AMF Identity.";
      min-elements 1;
      max-elements 1;
      key "amfRegionId amfSetId amfPointer";
      uses types3gpp:AmfIdentifier;
    }
  }

  grouping Tai {
```

```
    list plmnId {
      description "PLMN Identity.";
      min-elements 1;
      max-elements 1;
      key "mcc mnc";
      uses types3gpp:PLMNId;
    }

    leaf tac { type types3gpp:Tac; }
  }

  grouping InterfaceUpfInfoItem {
    leaf interfaceType {
      description "User Plane interface type.";
      mandatory true;
      type UPInterfaceType;
    }

    ////At least one of the addressing parameters (ipv4address, ipv6adress or endpointFqdn) shall be
included in the InterfaceUpfInfoItem.
    choice address {
      case ipv4EndpointAddresses {
        leaf-list ipv4EndpointAddresses {
          description "Available endpoint IPv4 address(es) of the User Plane interface.";
          //conditional support
          min-elements 1;
          type inet:ipv4-address;
        }
      }

      case ipv6EndpointAddresses {
        leaf-list ipv6EndpointAddresses {
          description "Available endpoint IPv6 address(es) of the User Plane interface.";
          //conditional support
          min-elements 1;
          type inet:ipv6-address;
        }
      }

      case endpointFqdn {
        leaf endpointFqdn {
          description "FQDN of available endpoint of the User Plane interface.";
          //conditional support
          type inet:domain-name;
        }
      }
    }

    leaf networkInstance {
      description "Network Instance associated to the User Plane interface.";
      //optional support
      type string;
    }
  }

  typedef UPInterfaceType {
    type enumeration {
      enum N3;
      enum N6;
      enum N9;
    }
  }

  grouping TaiRange {
    list plmnId {
      description "PLMN ID related to the TacRange.";
      min-elements 1;
      max-elements 1;
      key "mcc mnc";
      uses types3gpp:PLMNId;
    }

    list tacRangeList { //is this key unique
      description "The range of the TACs.";
      min-elements 1;
      key "start end";
      uses TacRange;
    }
```

```
  }

  typedef AccessType {
    type enumeration {
      enum 3GPP_ACCESS;
      enum NON_3GPP_ACCESS;
    }
  }

  grouping N2InterfaceAmfInfo {
    //At least one of the addressing parameters (ipv4address or ipv6adress) shall be included.
    choice address {
      case ipv4EndpointAddress {
        leaf-list ipv4EndpointAddress {
          description "Available AMF endpoint IPv4 address(es) for N2.";
          //conditional support
          min-elements 1;
          type inet:ipv4-address;
        }
      }

      case ipv6EndpointAddress {
        leaf-list ipv6EndpointAddress {
          description "Available AMF endpoint IPv6 address(es) for N2.";
          //conditional support
          min-elements 1;
          type inet:ipv6-address;
        }
      }
    }

    leaf amfName {
      description "AMF name.";
      type string;
    }
  }

  grouping sNssaiSmfInfoItem {
    list sNssai { //is the key unique
      description "Supported S-NSSAI.";
      min-elements 1;
      max-elements 1;
      key "sst sd";
      uses Snssai;
    }

    list dnnSmfInfoList { //is the key unique
      description "List of parameters supported by the SMF per DNN.";
      min-elements 1;
      key dnn;
      uses DnnSmfInfoItem;
    }
  }

  grouping DnnSmfInfoItem {
    leaf dnn {
      description "Supported DNN.";
      mandatory true;
      type string;
    }
  }

  grouping PlmnSnssai {
    list plmnId {
      description "PLMN ID for which list of supported S-NSSAI(s) is provided.";
      min-elements 1;
      max-elements 1;
      key "mcc mnc";
      uses types3gpp:PLMNId;
    }

    list sNssaiList { //is the key unique
      description "The specific list of S-NSSAIs supported by the given PLMN.";
      min-elements 1;
      key "sst sd";
      uses Snssai;
    }
  }
```

```
}
```

H.5.13 module _3gpp-5gc-nrm-nfservice@2019-06-17.yang

```
module _3gpp-5gc-nrm-nfservice {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-nfservice;
  prefix nfs3gpp;

  import _3gpp-common-yang-types { prefix types3gpp; }
  import ietf-yang-types { prefix yang; }
  import ietf-inet-types { prefix inet; }

  organization "3gpp SA5";
  description "NF service class.";
  reference "3GPP TS 29.510";

  revision 2019-06-17 {
    description "initial revision";
  }

  grouping NFServiceGrp {
    leaf serviceInstanceID {
      description "Unique ID of the service instance within a given NF Instance.";
      mandatory true;
      type string;
    }

    leaf serviceName {
      description "Name of the service instance (e.g. 'nudm-sdm').";
      mandatory true;
      type ServiceName;
    }

    list versions { //check in review if key is ok (unique)
      description "API versions supported by the NF Service and if available, the corresponding
retirement date of the NF Service.";
      min-elements 1;
      key "apiVersionInUri apiFullVersion";
      uses NFServiceVersion;
    }

    leaf scheme {
      description "URI scheme (e.g. 'http', 'https').";
      mandatory true;
      type UriScheme;
    }

    leaf nfServiceStatus {
      description "Status of the NF Service Instance.";
      mandatory true;
      type NFServiceStatus;
    }

    leaf fqdn {
      description "FQDN of the NF Service Instance.";
      //optional support
      type inet:domain-name;
    }

    leaf interPlmnFqdn {
      description "If the NF service needs to be discoverable by other NFs in a different PLMN,
                   then an FQDN that is used for inter PLMN routing.";
      //optional support
      type inet:domain-name;
    }

    list ipEndPoints {
      description "IP address(es) and port information of the Network Function (including IPv4
and/or IPv6 address)
                   where the service is listening for incoming service requests.";
      //optional support

      key idx;
      leaf idx {
        type string;
```

```
      }
      min-elements 1;
      uses ipEndPoint;
    }

    leaf apiPrefix {
      description "Optional path segment(s) used to construct the {apiRoot} variable of the
different API URIs.";
      //optional support
      type string;
    }

    list defaultNotificationSubscriptions {
      description "Notification endpoints for different notification types.";
      key notificationType;
      //optional support
      min-elements 1;
      uses types3gpp:DefaultNotificationSubscription;
    }

    list allowedPlmns {
      description "PLMNs allowed to access the service instance.
                   The absence of this attribute indicates that any PLMN is allowed to access the
service instance.";

      min-elements 1;
      //optional support
      key "mcc mnc";
      uses types3gpp:PLMNId;
    }

    leaf-list allowedNfTypes {
      description "Type of the NFs allowed to access the service instance.
                   The absence of this attribute indicates that any NF type is allowed to access the
service instance.";

      min-elements 1;
      //optional support
      type types3gpp:NfType;
    }

    leaf-list allowedNfDomains {
      description "Pattern representing the NF domain names allowed to access the service
instance.";
      //optional support
      min-elements 1;
      type string;
    }

    leaf-list allowedNssais {
      description "S-NSSAI of the allowed slices to access the service instance.
                   The absence of this attribute indicates that any slice is allowed to access the
service instance.";
      min-elements 1;
      //optional support
      type types3gpp:SNssai;
    }

    leaf priority {
      description "Priority (relative to other services of the same type) in the range of 0-65535,
                   to be used for NF Service selection; lower values indicate a higher priority.";
      //optional support
      type uint16;
    }

    leaf capacity {
      description "Static capacity information in the range of 0-65535, expressed as a weight
relative to other services of the same type.";
      //optional support
      type uint16;
    }

    leaf load {
      description "Dynamic load information, ranged from 0 to 100, indicates the current load
percentage of the NF Service.";
      //optional support
      type types3gpp:Load;
    }
```

```
    leaf recoveryTime {
      description "Timestamp when the NF was (re)started.";
      //optional support
      type yang:date-and-time;
    }

    list chfServiceInfo { //is the key unique
      description "Specific data for a CHF service instance.";
      //optional support
      max-elements 1;
      key "primaryChfServiceInstance secondaryChfServiceInstance";
      uses ChfServiceInfo;
    }

    leaf supportedFeatures {
      description "Supported Features of the NF Service instance.";
      //optional support
      type SupportedFeatures;
    }
  }

  typedef SupportedFeatures {
    type string {
      pattern '[A-Fa-f0-9]*';
    }
  }

  grouping ipEndPoint {
    choice address {
      leaf ipv4Address {
        type inet:ipv4-address;
      }

      leaf ipv6Address {
        type inet:ipv6-address;
      }

      leaf ipv6Prefix {
        type inet:ipv6-prefix;
      }
    }

    leaf transport {
      type TransportProtocol;
    }

    leaf port {
      type uint16;
    }
  }

  typedef TransportProtocol {
    type enumeration {
      enum TCP;
      enum STCP;
      enum UDP;
    }
  }

  grouping NFServiceVersion {
    leaf apiVersionInUri {
      mandatory true;
      type string;
    }

    leaf apiFullVersion {
      mandatory true;
      type string;
    }

    leaf expiry {
      //optional to support
      type yang:date-and-time;
    }
  }

  typedef ServiceName {
```

```
    type enumeration {
      enum NNRF_NFM;
      enum NNRF_DISC;
      enum NUDM_SDM;
      enum NUDM_UECM;
      enum NUDM_UEAU;
      enum NUDM_EE;
      enum NUDM_PP;
      enum NAMF_COMM;
      enum NAMF_EVTS;
      enum NAMF_MT;
      enum NAMF_LOC;
      enum NSMF_PDUSESSION;
      enum NSMF_EVENT-EXPOSURE;
      enum NAUSF_AUTH;
      enum NAUSF_SORPROTECTION;
      enum NNEF_PFDMANAGEMENT;
      enum NPCF_AM-POLICY-CONTROL;
      enum NPCF_SMPOLICYCONTROL;
      enum NPCF_POLICYAUTHORIZATION;
      enum NPCF_BDTPOLICYCONTROL;
      enum NPCF_EVENTEXPOSURE;
      enum NPCF_UE_POLICY_CONTROL;
      enum NSMSF_SMS;
      enum NNSSF_NSSELECTION;
      enum NNSSF_NSSAIAVAILABILITY;
      enum NUDR_DR;
      enum NLMF_LOC;
      enum N5G_EIR_EIC;
      enum NBSF_MANAGEMENT;
      enum NCHF_SPENDINGLIMITCONTROL;
      enum NCHF_CONVERGEDCHARGING;
      enum NNWDAF_EVENTSSUBSCRIPTION;
      enum NNWDAF_ANALYTICSINFO;
    }
  }

  typedef UriScheme {
    type enumeration {
      enum HTTP;
      enum HTTPS;
    }
  }

  typedef NFServiceStatus {
    type enumeration {
      enum REGISTERED;
      enum SUSPENDED;
      enum UNDISCOVERABLE;
    }
  }

  grouping ChfServiceInfo {
    leaf primaryChfServiceInstance {
      description "Shall be present if the CHF service instance serves as a secondary CHF instance
of another primary CHF service instance.";
      //conditional to support
      type string;
    }

    leaf secondaryChfServiceInstance {
      description "Shall be present if the CHF service instance serves as a primary CHF instance of
another secondary CHF service instance.";
      //conditional to support
      type string;
    }
  }
}
```

H.5.14 module _3gpp-5gc-nrm-ngeirfunction@2019-10-25.yang

```
module _3gpp-5gc-nrm-ngeirfunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-ngeirfunction;
  prefix ngeir3gpp;
```

```
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the 5G-EIR function in 5GC. For more information about the 5G-
EIR, see 3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

  revision 2019-05-15 {
    description "initial revision";
    reference "Based on
      3GPP TS 28.541 V15.X.XX";
  }

  grouping NGEIRFunctionGrp {
    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;
    }

    leaf-list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                   (Slice Differentiator) field.";
      //optional support
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
    }

    list commModelList {
      min-elements 1;
      key "groupId";
      uses types5g3gpp:CommModel;
    }
  }

  augment "/me3gpp:ManagedElement" {
    list NGEIRFunction {
      description "5G Core NGEIR Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses NGEIRFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.15 module _3gpp-5gc-nrm-nrffunction@2019-10-28.yang

```
module _3gpp-5gc-nrm-nrffunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-nrffunction;
```

```
  prefix nrf3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import ietf-inet-types { prefix inet; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5gc-nrm-nfprofile { prefix nfp3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the NRF function in 5GC.
               For more information about the NRF, see 3GPP TS 23.501 [2].";
  reference "3GPP TS 28.541";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-05-15 {
    description "initial revision";
  }

  grouping NRFFunctionGrp {
    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;
    }

    leaf sBIFQDN {
      description "The FQDN of the registered NF instance in the service-based interface.";
      type inet:domain-name;
    }

    leaf-list cNSIIdListWrap {
      description "Set of CNSI Ids. The CNSI ID only represents the Core Network Slice Instance
Identifier.";
      //optional support
      type types3gpp:CNsiId;
    }

    leaf-list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                   (Slice Differentiator) field.";
      //optional support
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    list nFProfileList {
      description "Set of NFProfile(s) to be registered in the NRF instance.";
      //optional support
      key nfInstanceID;
      uses nfp3gpp:NFProfileGrp;
    }
  }

  augment "/me3gpp:ManagedElement" {
    list NRFFunction {
      description "5G Core NRF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses NRFFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.16 module _3gpp-5gc-nrm-nssffunction@2019-10-25.yang

```
module _3gpp-5gc-nrm-nssffunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-nssffunction;
  prefix nssf3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import ietf-inet-types { prefix inet; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the NSSF function in 5GC. For more information about the NSSF,
see 3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

  revision 2019-05-15 {
    description "initial revision";

  }

  grouping NSSFFunctionGrp {
    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;
    }

    leaf sBIFQDN {
      description "The FQDN of the registered NF instance in the service-based interface.";
      type inet:domain-name;
    }

    leaf-list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                   (Slice Differentiator) field.";

      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    leaf-list cNSIIdListWrap {
      description "Set of CNSI Ids. The CNSI ID only represents the Core Network Slice Instance
Identifier.";
      //optional support
      type types3gpp:CNsiId;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
    }
  }

  augment "/me3gpp:ManagedElement" {
    list NSSFFunction {
      description "5G Core NSSF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
```

```
        uses NSSFFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.17 module _3gpp-5gc-nrm-nwdaffunction@2019-10-25.yang

```
module _3gpp-5gc-nrm-nwdaffunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-nwdaffunction;
  prefix nwdaf3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import ietf-inet-types { prefix inet; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the NWDAF function in 5GC. For more information about the NWDAF,
see 3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

  revision 2019-05-15 {
    description "initial revision";
    reference "Based on
      3GPP TS 28.541 V15.X.XX";
  }

  grouping NWDAFFunctionGrp {
    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;
    }

    leaf sBIFQDN {
      description "The FQDN of the registered NF instance in the service-based interface.";
      type inet:domain-name;
    }

    leaf-list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                   (Slice Differentiator) field.";
      //optional support
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
    }

    list commModelList {
      min-elements 1;
      key "groupId";
      uses types5g3gpp:CommModel;
    }
```

```
  }

  augment "/me3gpp:ManagedElement" {
    list NWDAFFunction {
      description "5G Core NWDAF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses NWDAFFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.18 module _3gpp-5gc-nrm-pcffunction@2019-10-25.yang

```
module _3gpp-5gc-nrm-pcffunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-pcffunction;
  prefix pcf3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import ietf-inet-types { prefix inet; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the PCF function in 5GC. For more information about the PCF, see
3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-10-25 {reference "S5-194457 S5-193518"; }

  revision 2019-05-22 {
    description "initial revision";
  }

  grouping PCFFuntionGrp {
    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;
    }

    leaf sBIFQDN {
      description "The FQDN of the registered NF instance in the service-based interface.";
      type inet:domain-name;
    }

    leaf-list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                   (Slice Differentiator) field.";
      //optional support
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
    }
```

```
    list commModelList {
      min-elements 1;
      key "groupId";
      uses types5g3gpp:CommModel;
    }
  }

  augment "/me3gpp:ManagedElement" {
    list PCFFunction {
      description "5G Core PCF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses PCFFuntionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.19 module _3gpp-5gc-nrm-seppfunction@2019-11-17.yang

```
module _3gpp-5gc-nrm-seppfunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-seppfunction;
  prefix sepp3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import ietf-inet-types { prefix inet; }

  organization "3gpp SA5";
  description "This IOC represents the SEPP function which support message filtering
               and policing on inter-PLMN control plane interface. For more information about the
SEPP, see 3GPP TS 23.501.";
  reference "3GPP TS 28.541";

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

  revision 2019-11-17 {
    description "initial revision";
  }

  typedef SEPPType {
    reference "3GPP TS 23501";
    type enumeration {
      enum CSEPP {
        value 0;
        description "consumer SEPP";
      }

      enum PSEPP {
        value 1;
        description "producer SEPP";
      }
    }
  }

  grouping SEPPFunctionGrp {
    uses mf3gpp:ManagedFunctionGrp;

    container pLMNId {
      description "PLMN Identifiers of the sepp.
                   The PLMN Identifier is composed of a Mobile Country Code (MCC) and a Mobile
Network Code (MNC).";
      uses types3gpp:PLMNId;
    }

    leaf sEPPType {
      type sepp3gpp:SEPPType;
    }

    leaf sEPPId {
```

```
      type uint16;
    }

    leaf fqdn {
      description "The domain name of the SEPP.";
      type inet:domain-name;
    }
  }

  augment "/me3gpp:ManagedElement" {
    list SEPPFunction {
      description "5G Core SEPP Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses SEPPFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;    }
  }
}
```

H.5.19amodule _3gpp-5gc-nrm- externalseppfunction@2019-11-17.yang

```
module _3gpp-5gc-nrm-externalseppfunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-extternalseppfunction;
  prefix extsepp3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import ietf-inet-types { prefix inet; }

  organization "3gpp SA5";
  description "This IOC represents the external SEPP function which support message filtering
               and policing on inter-PLMN control plane interface. For more information about the
SEPP, see 3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-11-17 {
    description "initial revision";
    reference "Based on
      3GPP TS 28.541 V16.X.XX";
  }

  grouping ExternalSEPPFunctionGrp {
    uses mf3gpp:ManagedFunctionGrp;

    container pLMNId {
      description "PLMN Identifiers of the sepp.
                   The PLMN Identifier is composed of a Mobile Country Code (MCC) and a Mobile
Network Code (MNC).";
      uses types3gpp:PLMNId;
    }

    leaf sEPPId {
      type uint16;
    }

    leaf fqdn {
      description "The domain name of the SEPP.";
      type inet:domain-name;
    }

  }

  augment "/me3gpp:ManagedElement" {
    list ExternalSEPPFunction {
      description "5G Core SEPP Function";
      reference "3GPP TS 28.541";
```

```
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalSEPPFunctionGrp;
      }
    }
  }
}
```

H.5.20 module _3gpp-5gc-nrm-smffunction@2030-06-03.yang

```
module _3gpp-5gc-nrm-smffunction {
  yang-version 1.1;
  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-smffunction;
  prefix smf3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import ietf-inet-types { prefix inet; }
  import _3gpp-common-top { prefix top3gpp; }

  description "SMFFunction derived from basic ManagedFunction.";

  revision 2020-06-03 { reference "CR-0286"; }
  revision 2019-10-25 { reference "S5-194457 S5-193518"; }
  revision 2019-05-31 {
    description "Ericsson refactoring.";
  }

  revision 2018-08-07 {
    description "Initial revision";
  }

  grouping SMFFunctionGrp {
    uses mf3gpp:ManagedFunctionGrp;

    list pLMNIdList {
      min-elements 1;
      description "A list of PLMN identifiers (Mobile Country Code and Mobile Network Code).";
      key "mcc mnc";
      uses types3gpp:PLMNId;
    }

    leaf-list nRTACList {
      description "List of Tracking Area Codes (legacy TAC or extended TAC)
      where the represented management function is serving.";
      reference "TS 38.413 clause 9.3.3.10";
      min-elements 1;
      config false;
      type types3gpp:Tac;
    }

    leaf sBIFQDN {
      description "The FQDN of the registered NF instance in the service-based interface.";
      type inet:domain-name;
    }

    leaf-list sNSSAIList {
      min-elements 0;
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                   (Slice Differentiator) field.";
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
    }

    list commModelList {
```

```
      min-elements 1;
      key "groupId";
      uses types5g3gpp:CommModel;
    }

    leaf configurable5QISetRef {
      type types3gpp:DistinguishedName;
      description "DN of the Configurable5QISet that the SMFFunction supports (is associated to).";
    }
  }

  augment "/me3gpp:ManagedElement" {
    list SMFFunction {
      description "5G Core SMF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses SMFFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.21 module _3gpp-5gc-nrm-smsffunction@2019-10-25.yang

```
module _3gpp-5gc-nrm-smsffunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-smsffunction;
  prefix smsf3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the SMSF function defined in 3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

  revision 2019-05-15 {
    description "initial revision";

  }

  grouping SMSFFunctionGrp {
    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;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
    }

    list commModelList {
      min-elements 1;
      key "groupId";
      uses types5g3gpp:CommModel;
    }
  }
```

```
  augment "/me3gpp:ManagedElement" {
    list SMSFFunction {
      description "5G Core SMSF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses SMSFFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.22 module _3gpp-5gc-nrm-udmfunction@2019-10-25.yang

```
module _3gpp-5gc-nrm-udmfunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-udmfunction;
  prefix udm3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import ietf-inet-types { prefix inet; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the UDM function in 5GC. For more information about the UDM, see
3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

  revision 2019-05-22 {
    description "initial revision";
  }

  grouping UDMFuntionGrp {
    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;
    }

    leaf sBIFQDN {
      description "The FQDN of the registered NF instance in the service-based interface.";
      type inet:domain-name;
    }

    leaf-list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                   (Slice Differentiator) field.";
      //optional support
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
    }
```

```
    list commModelList {
      min-elements 1;
      key "groupId";
      uses types5g3gpp:CommModel;
    }
  }

  augment "/me3gpp:ManagedElement" {
    list UDMFunction {
      description "5G Core UDM Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses UDMFuntionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.23 module _3gpp-5gc-nrm-udrfunction@2019-10-25.yang

```
module _3gpp-5gc-nrm-udrfunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-udrfunction;
  prefix udr3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import ietf-inet-types { prefix inet; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the UDR function in 5GC. For more information about the UDR, see
3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

  revision 2019-05-22 {
    description "initial revision";
  }

  grouping UDRFuntionGrp {
    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;
    }

    leaf sBIFQDN {
      description "The FQDN of the registered NF instance in the service-based interface.";
      type inet:domain-name;
    }

    leaf-list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                   (Slice Differentiator) field.";
      //optional support
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    list managedNFProfile {
```

```
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
    }
  }

  augment "/me3gpp:ManagedElement" {
    list UDRFunction {
      description "5G Core UDR Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses UDRFuntionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.24 module _3gpp-5gc-nrm-udsffunction@2019-10-25.yang

```
module _3gpp-5gc-nrm-udsffunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-udsffunction;
  prefix udsf3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import ietf-inet-types { prefix inet; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the UDSF function which can be interacted with any other 5GC NF
defined in 3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

  revision 2019-05-22 {
    description "initial revision";

  }

  grouping UDSFFuntionGrp {
    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;
    }

    leaf sBIFQDN {
      description "The FQDN of the registered NF instance in the service-based interface.";
      type inet:domain-name;
    }

    leaf-list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                   (Slice Differentiator) field.";
      //optional support
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    list managedNFProfile {
```

```
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
    }
  }

  augment "/me3gpp:ManagedElement" {
    list UDSFFunction {
      description "5G Core UDSF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses UDSFFuntionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;    }
  }
}
```

H.5.25 module _3gpp-5gc-nrm-upffunction@2019-10-25.yang

```
module _3gpp-5gc-nrm-upffunction {
  yang-version 1.1;
  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-upffunction;
  prefix upf3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  description "UPFFunction derived from basic ManagedFunction.";

  revision 2019-10-25 { reference "S5-194457 S5-193518"; }
  revision 2019-05-31 {
    description "Ericsson refactoring.";
  }

  revision 2018-08-07 {
    description "Initial revision";
  }

  grouping UPFFunctionGrp {
    uses mf3gpp:ManagedFunctionGrp;

    list pLMNIdList {
      description "A list of PLMN identifiers (Mobile Country Code and Mobile Network Code).";
      min-elements 1;
      key "mcc mnc";
      uses types3gpp:PLMNId;
    }

    leaf-list nRTACList {
      description "List of Tracking Area Codes (legacy TAC or extended TAC)
                   where the represented management function is serving.";
                   reference "TS 38.413 clause 9.3.3.10";
      min-elements 1;
      config false;
      type types3gpp:Tac;
    }

    leaf-list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                  (Slice Differentiator) field.";
      min-elements 0;
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      uses types3gpp:ManagedNFProfile;
    }
```

```
    list commModelList {
      min-elements 1;
      key "groupId";
      uses types5g3gpp:CommModel;
    }
  }

  augment /me3gpp:ManagedElement {
    list UPFFunction {
      description "5G Core UPF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses UPFFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

H.5.26 module _3gpp-5gc-nrm-scpfunction@2019-10-20.yang

```
module _3gpp-5gc-nrm-scpfunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-scpfunction;
  prefix scp3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import ietf-inet-types { prefix inet; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the SCP function in 5GC. For more information about the SCP, see
3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-10-20 {
    description "initial revision";
    reference "Based on
      3GPP TS 28.541 V16.X.XX";
  }

  grouping SCPFunctionGrp {
    uses mf3gpp:ManagedFunctionGrp;

    leaf address {
      description "The host address of the SCP.";
      type inet:host;
    }

    list supportedFuncList {
      min-elements 1;
      key "function";
      uses types5g3gpp:SupportedFunc;
    }

  }

  augment "/me3gpp:ManagedElement" {
    list SCPFunction {
      description "5G Core SCP Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses SCPFunctionGrp;
      }
    }
  }
}
```

H.5.27 module _3gpp-5gc-nrm-neffunction@2019-10-20.yang

```
module _3gpp-5gc-nrm-neffunction {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-neffunction;
  prefix nef3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import ietf-inet-types { prefix inet; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the NEF function in 5GC. For more information about the NEF, see
3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2019-10-20 {
    description "initial revision";
    reference "Based on
      3GPP TS 28.541 V16.X.XX";
  }

  grouping NEFFunctionGrp {
    uses mf3gpp:ManagedFunctionGrp;

    leaf sBIFQDN {
      description "The FQDN of the registered NF instance in the service-based interface.";
      type inet:domain-name;
    }

    leaf-list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
                   (Single Network Slice Selection Assistance Information)
                   An S-NSSAI has an SST (Slice/Service type) and an optional SD
                   (Slice Differentiator) field.";
      type types3gpp:SNssai;
    }

    leaf-list capabilityList {
      description "List of supported capabilities of the NEF.";
      reference "3GPP TS 23.003";
      type string;
    }

    leaf isINEF {
      type boolean;
    }

    leaf isCAPIFSup {
      type boolean;
    }

  }

  augment "/me3gpp:ManagedElement" {
    list NEFFunction {
      description "5G Core NEF Function";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses NEFFunctionGrp;
      }
    }
  }
}
```

H.5.28 module _3gpp-5gc-nrm-QFQoSMonitoringControl@2020-04-10.yang

```
module _3gpp-5gc-nrm-QFQoSMonitoringControl {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-QFQoSMonitoringControl;
  prefix qFQMCtrl3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-5gc-nrm-smffunction { prefix smf3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  description "This IOC represents the capabilities and properties for control of QoS monitoring per
    QoS flow per UE for URLLC service defined in 3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2020-04-10 {
    description "Initial revision";
    reference "S5-202101";
  }

  grouping QFDelayThresholdsType {
    leaf thresholdDl {
      mandatory true;
      type uint32;
    }
    leaf thresholdUl {
      mandatory true;
      type uint32;
    }
    leaf thresholdRtt {
      mandatory true;
      type uint32;
    }
    reference "TS 28.541";
  }

  grouping QFQoSMonitoringControlGrp {
    description "Represents the QFQoSMonitoringControl IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp: Top_Grp;

    leaf qFQoSMonitoringState {
      description "The state of QoS monitoring per QoS flow per UE.";
      mandatory true;
      type enumeration {
        enum ENABLED;
        enum DISABLED;
      }
    }

    leaf-list qFMonitoredSNSSAIs {
      description "The S-NSSAIs for which the QoS monitoring per QoS flow per UE is to be
        performed.";
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    leaf-list qFMonitored5QIs {
      description "The 5QIs for which the QoS monitoring per QoS flow per UE is to be
        performed.";
      reference "3GPP TS 23.501";
      type uint32 {
        range "0..255";
      }
    }

    leaf isEventTriggeredQFMonitoringSupported {
      description "It indicates whether the event based QoS monitoring reporting per QoS
        flow per UE is supported.";
```

```
      mandatory true;
      reference "3GPP TS 29.244";
      type boolean;
    }

    leaf isPeriodicQFMonitoringSupported {
      description "It indicates whether the periodic QoS monitoring reporting per QoS flow
        per UE is supported.";
      mandatory true;
      reference "3GPP TS 29.244";
      type boolean;
    }

    leaf isSessionReleasedQFMonitoringSupported {
      description "It indicates whether the session release based QoS monitoring reporting
        per QoS flow per UE is supported.";
      mandatory true;
      reference "3GPP TS 29.244";
      type boolean;
    }

    leaf qFPacketDelayThresholds {
      description "It specifies the thresholds for reporting the packet delay between PSA
        and UE for QoS monitoring per QoS flow per UE.";
      mandatory false;
      type QFPacketDelayThresholdsType;
    }

    leaf qFMinimumWaitTime {
      description "It specifies the minimum waiting time (in seconds) between two
        consecutive reports for event triggered QoS monitoring reporting per QoS flow per
        UE.";
      mandatory false;
      type uint32;
    }

    leaf qFMeasurementPeriod {
      description "It specifies the period (in seconds) for reporting the packet delay for
        QoS monitoring per QoS flow per UE.";
      mandatory false;
      type uint32;
    }
  }

  augment "/me3gpp:ManagedElement/smf3gpp:SMFFunction " {

    list QFQoSMonitoringControl {
      description "Represents the QFQoSMonitoringControl IOC.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses QFQoSMonitoringControlGrp;
      }
    }
  }
}
```

H.5.29 module _3gpp-5gc-nrm-GtpUPathQoSMonitoringControl@2020-04-10.yang

```
module _3gpp-5gc-nrm-GtpUPathQoSMonitoringControl {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-GtpUPathQoSMonitoringControl;
  prefix gtpUPathQMCtrl3gpp;

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-5gc-nrm-smffunction { prefix smf3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
```

```
  organization "3gpp SA5";
  description "This IOC represents the capabilities and properties for control of GTP-U path QoS
    monitoring defined in 3GPP TS 23.501.";
  reference "3GPP TS 28.541";

  revision 2020-04-10 {
    description "Initial revision";
    reference "S5-202103";
  }

  grouping GtpUPathDelayThresholdsType {
    leaf n3AveragePacketDelayThreshold {
      mandatory true;
      type uint32;
    }
    leaf n3MinPacketDelayThreshold {
      mandatory true;
      type uint32;
    }
    leaf n3MaxPacketDelayThreshold {
      mandatory true;
      type uint32;
    }
    leaf n9AveragePacketDelayThreshold {
      mandatory true;
      type uint32;
    }
    leaf n9MinPacketDelayThreshold {
      mandatory true;
      type uint32;
    }
    leaf n9MaxPacketDelayThreshold {
      mandatory true;
      type uint32;
    }
    reference "TS 28.541";
  }

  grouping GtpUPathQoSMonitoringControlGrp {
    description "Represents the GtpUPathQoSMonitoringControl IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp: Top_Grp;

    leaf gtpUPathQoSMonitoringState {
      description "The state of GTP-U path QoS monitoring.";
      mandatory true;
      type enumeration {
        enum ENABLED;
        enum DISABLED;
      }
    }

    leaf-list gtpUPathMonitoredSNSSAIs {
      description "The S-NSSAIs for which the the GTP-U path QoS monitoring is to be performed.";
      reference "3GPP TS 23.003";
      type types3gpp:SNssai;
    }

    leaf-list monitoredDSCPs {
      description "The DSCPs for which the GTP-U path QoS monitoring is to be performed.";
      reference "3GPP TS 29.244";
      type uint32;
    }

    leaf isEventTriggeredGtpUPathMonitoringSupported {
      description "It indicates whether the event triggered GTP-U path QoS monitoring reporting
        based on thresholds is supported.";
      mandatory true;
      reference "3GPP TS 29.244";
      type boolean;
    }

    leaf isPeriodicGtpUMonitoringSupported {
      description "It indicates whether the periodic GTP-U path QoS monitoring reporting is
        supported.";
      mandatory true;
      reference "3GPP TS 29.244";
```

```
      type boolean;
    }

    leaf isImmediateGtpUMonitoringSupported {
      description "It indicates whether the immediate GTP-U path QoS monitoring reporting is
        supported.";
      mandatory true;
      reference "3GPP TS 29.244";
      type boolean;
    }

    leaf gtpUPathDelayThresholds {
      description "It specifies the thresholds for reporting the packet delay for the GTO-U path QoS
        monitoring.";
      mandatory false;
      type GtpUPathDelayThresholdsType;
    }

    leaf gtpUPathMinimumWaitTime {
      description "It specifies the minimum waiting time (in seconds) between two consecutive
        reports for event triggered GTP-U path QoS monitoring reporting.";
      mandatory false;
      type uint32;
    }

    leaf gtpUPathMeasurementPeriod {
      description "It specifies the period (in seconds) for reporting the packet delay for GTP-U
        path QoS monitoring.";
      mandatory false;
      type uint32;
    }
  }

  augment "/me3gpp:ManagedElement/smf3gpp:SMFFunction " {

    list GtpUPathQoSMonitoringControl {
      description "Represents the GtpUPathQoSMonitoringControl IOC.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses GtpUPathQoSMonitoringControlGrp;
      }
    }
  }
}
```

H.5.30 module _3gpp-5gc-nrm-Configurable5QISet@2020-06-03.yang

```
module _3gpp-5gc-nrm-configurable5qiset {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-configurable5qiset;
  prefix Conf5QIs3gpp;

  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-5gc-nrm-smffunction { prefix smf3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-nr-nrm-gnbcuupfunction { prefix gnbcuup3gpp; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "This IOC represents the non-standardized 5QIs, including
    their QoS characteristics, that need to be pre-configured
    (and configurable) to the 5G NFs.";
  reference "3GPP TS 28.541";

  revision 2020-06-03 { reference "CR-0286"; }

  grouping PacketErrorRate {
    leaf scalar {
      type uint32 {
        range 0..9 ;
```

```
      }
      mandatory true;
      description "The Packet Error Rate of a 5QI expressed as Scalar x 10-k where k is the
Exponent.";
    }
    leaf exponent {
      type uint32 {
        range 0..9 ;
      }
      mandatory true;
      description "The Packet Error Rate of a 5QI expressed as Scalar x 10-k, where k is the
Exponent.";
    }
  }

  grouping FiveQICharacteristics {
    leaf fiveQIValue {
      type uint32 {
        range 0..255 ;
      }
      mandatory true;
      description "Identifies the 5QI value.";
    }

    leaf resourceType {
      type enumeration {
        enum GBR;
        enum NON_GBR;
      }
      mandatory true;
      description "It indicates the Resource Type of a 5QI, as specified in TS 23.501 ";
    }

    leaf priorityLevel {
      type uint32 {
        range 0..127 ;
      }
    }

    leaf packetDelayBudget {
      type uint32 {
        range 0..1023 ;
      }
      description "Indicates the Packet Delay Budget (in unit of 0.5ms)of a 5QI, as specified in TS
23.501 ";
    }

    list packetErrorRate {
      key "scalar exponent";
      min-elements 0;
      max-elements 1;
      uses PacketErrorRate;
      reference "TS 23.501";
    }

    leaf averagingWindow {
      type uint32 {
        range 0..4095 ;
      }
      units ms;
      reference "TS 23.501";
    }

    leaf maximumDataBurstVolume {
      type uint32{
        range 0..4095 ;
      }
      units byte;
    }
  }

  grouping Configurable5QISetGrp {
    description "Represents the Configurable5QISet IOC.";
    list configurable5QIs {
      key "fiveQIValue";
      uses FiveQICharacteristics;
    }
  }
```

```
  grouping Configurable5QISetSubtree {
    list Configurable5QISet {
      description "Specifies the non-standardized 5QIs, including their QoS
        characteristics, that need to be pre-configured (and configurable) to
        the 5G NFs, see 3GPP TS 23.501.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses Configurable5QISetGrp;
      }
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    uses Configurable5QISetSubtree;
  }

  augment "/me3gpp:ManagedElement" {
    uses Configurable5QISetSubtree;
  }
}
```

H.5.31 module _3gpp-5gc-nrm-FiveQiDscpMappingSet@2020-05-27.yang

```
module _3gpp-5gc-nrm-FiveQiDscpMappingSet {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-FiveQiDscpMappingSet;
  prefix FiveQiDscpMapping3gpp;

  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-5gc-nrm-smffunction { prefix smf3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-nr-nrm-gnbcuupfunction { prefix gnbcuup3gpp; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description " This IOC represents the set of mapping between 5QIs and DSCP.";
  reference "3GPP TS 28.541";

  revision 2020-05-27 { reference "CR-0287"; }

  grouping FiveQiDscpMapping {
    leaf-list fiveQIValues {
      type uint32 {
        range 0..255 ;
      }
      mandatory true;
      description " Identifies the 5QI values that are mapped to a same DSCP, as specified in TS
28.541.";
    }

    leaf dscp {
      type uint32 {
        range 0..255 ;
      }
      mandatory true;
    }
  }

  grouping FiveQiDscpMappingSetGrp {
    description "Represents the FiveQiDscpMappingSet IOC.";
    list FiveQiDscpMappingList {
      key "dscp";
      uses FiveQiDscpMapping;
    }
  }

  grouping FiveQiDscpMappingSetSubtree {
    list FiveQiDscpMappingSet {
      description "Specifies the mapping between 5QIs and DSCPs.";
      key id;
      uses top3gpp:Top_Grp;
```

```
      container attributes {
        uses FiveQiDscpMappingSetGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/smf3gpp:SMFFunction" {
    uses FiveQiDscpMappingSetSubtree;
  }
}
```

H.6 Void

H.7 Mount information

```
_3gpp-5gc-nrm-affunction.yang
_3gpp-5gc-nrm-amffunction.yang
_3gpp-5gc-nrm-amfregion.yang
_3gpp-5gc-nrm-amfset.yang
_3gpp-5gc-nrm-ausffunction.yang
_3gpp-5gc-nrm-dnfunction.yang
_3gpp-5gc-nrm-ep.yang
_3gpp-5gc-nrm-externalnrffunction.yang
_3gpp-5gc-nrm-externalnssffunction.yang
_3gpp-5gc-nrm-lmffunction.yang
_3gpp-5gc-nrm-n3iwffunction.yang
_3gpp-5gc-nrm-nfprofile.yang
_3gpp-5gc-nrm-nfservice.yang
_3gpp-5gc-nrm-ngeirfunction.yang
_3gpp-5gc-nrm-nrffunction.yang
_3gpp-5gc-nrm-nssffunction.yang
_3gpp-5gc-nrm-nwdaffunction.yang
_3gpp-5gc-nrm-pcffunction.yang
_3gpp-5gc-nrm-seppfunction.yang
_3gpp-5gc-nrm-smffunction.yang
_3gpp-5gc-nrm-smsffunction.yang
_3gpp-5gc-nrm-udmfunction.yang
_3gpp-5gc-nrm-udrfunction.yang
_3gpp-5gc-nrm-udsffunction.yang
_3gpp-5gc-nrm-upffunction.yang
```

If the above files are mounted the yang files described in clause E.7 shall also be mounted.

Annex I (normative): XML definitions for network slice

I.1 General

This annex contains the XML definitions for the network slice NRM, in accordance with network slice NRM Information Model definitions specified in clause 6.

I.2 Architectural features

The overall architectural feature of network slice information model is specified in clause 6, this clause specifies features that are specific to the Schema definitions.

The XML definitions of the present document specify the schema for a configuration content, which can be included in a configuration file for Bulk configuration management operations.

I.3 Mapping

I.3.1 General mapping

An IOC maps to an XML element of the same name as the IOC's name in the Information Model. An IOC attribute maps to a sub-element of the corresponding IOC's XML element, and the name of this sub-element is the same as the attribute's name in the Information Model.

I.3.2 Information Object Class (IOC) mapping

The mapping is not present in the current version of the present document.

I.4 Solution Set (SS) definitions

I.4.1 XML definition structure

The overall description of the file format of configuration data XML files is provided by 3GPP TS 32.616 [33].

This annex defines the NRM-specific XML schema sliceNrm.xsd for the network slice Information Model defined in clause 6.

XML schema sliceNrm.xsd explicitly declares NRM-specific XML element types for the related NRM.

The definition of those NRM-specific XML element types complies with the generic mapping rules defined in 3GPP TS 32.616 [33].

I.4.2 Graphical representation

The graphical representation is not present in the current version of the present document.

I.4.3 XML schema "sliceNrm.xsd"

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<!--
  3GPP TS 28.541 network slice Network Resource Model
  XML schema definition
  sliceNrm.xsd
-->
<schema xmlns="http://www.w3.org/2001/XMLSchema"
xmlns:xn="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"
xmlns:sl="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#sliceNrm"
xmlns:nn="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#nrNrm"
xmlns:ngc="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#ngcNrm"
xmlns:en="http://www.3gpp.org/ftp/specs/archive/28_series/28.659#eutranNrm"
xmlns:sm="http://www.3gpp.org/ftp/specs/archive/28_series/28.626#stateManagementIRP"
targetNamespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#sliceNrm"
elementFormDefault="qualified">
  <import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#nrNrm"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.541#ngcNrm"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.659#eutranNrm"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.626#stateManagementIRP"/>

  <simpleType name="MobilityLevel">
    <restriction base="string">
      <enumeration value="STATIONARY"/>
      <enumeration value="NOMADIC"/>
      <enumeration value="RESTRICTED MOBILITY"/>
      <enumeration value="FULLY MOBILITY"/>
    </restriction>
  </simpleType>
  <simpleType name="SharingLevel">
    <restriction base="string">
      <enumeration value="SHARED"/>
      <enumeration value="NON-SHARED"/>
    </restriction>
  </simpleType>
  <simpleType name="Category">
    <restriction base="string">
      <enumeration value="character"/>
      <enumeration value="scalability"/>
    </restriction>
  </simpleType>

  <simpleType name="Tagging">
    <restriction base="string">
      <enumeration value="performance"/>
      <enumeration value="function"/>
      <enumeration value="operation"/>
    </restriction>
  </simpleType>

  <simpleType name="Exposure">
    <restriction base="string">
      <enumeration value="API"/>
      <enumeration value="KPI"/>
    </restriction>
  </simpleType>

  <complexType name="ServAttrCom">
    <sequence>
          <element name="category" type="sl:Category"/>
          <element name="tagging" type="sl:Tagging" minOccurs="0"/>
      <element name="exposure" type="sl:Exposure" minOccurs="0"/>
</sequence>
</complexType >

  <simpleType name="DelayToleranceSupport">
    <restriction base="string">
      <enumeration value="NOT SUPPORTED"/>
      <enumeration value="SUPPORTED"/>
    </restriction>
  </simpleType>

  <simpleType name="DeterminCommAvailability">
    <restriction base="string">
      <enumeration value="NOT SUPPORTED"/>
      <enumeration value="SUPPORTED"/>
    </restriction>
  </simpleType>
```

```
<simpleType name="UserMgmtOpenSupport">
  <restriction base="string">
    <enumeration value="NOT SUPPORTED"/>
    <enumeration value="SUPPORTED"/>
  </restriction>
</simpleType>

<simpleType name="V2XCommModelsV2XMode">
  <restriction base="string">
    <enumeration value="NOT SUPPORTED"/>
    <enumeration value="SUPPORTED BY NR"/>
  </restriction>
</simpleType>

<complexType name="DelayTolerance">
  <sequence>
        <element name="servAttrCom" type="sl:ServAttrCom"/>
        <element name="support" type="sl:DelayToleranceSupport"/>
  </sequence>
</complexType>

<complexType name="DeterminComm">
  <sequence>
        <element name="servAttrCom" type="sl:ServAttrCom"/>
        <element name="availability" type="sl:DeterminCommAvailability"/>
        <element name="periodicityList" type="string"/>
  </sequence>
</complexType>

<complexType name="DLThpt">
  <sequence>
        <element name="servAttrCom" type="sl:ServAttrCom"/>
        <element name="guaThpt" type="float"/>
        <element name="maxThpt" type="float"/>
  </sequence>
</complexType>

<complexType name="ULThpt">
  <sequence>
        <element name="servAttrCom" type="sl:ServAttrCom"/>
        <element name="guaThpt" type="float" minOccurs="0"/>
        <element name="maxThpt" type="float" minOccurs="0"/>
  </sequence>
</complexType>

<complexType name="MaxPktSize">
  <sequence>
        <element name="servAttrCom" type="sl:ServAttrCom"/>
        <element name="maxsize" type="integer"/>
  </sequence>
</complexType>

<complexType name="KPIMonitoring">
  <sequence>
        <element name="servAttrCom" type="sl:ServAttrCom"/>
        <element name="kPIList" type="string"/>
  </sequence>
</complexType>

<complexType name="SupportedAccessTech">
  <sequence>
      <element name="servAttrCom" type="sl:ServAttrCom"/>
      <element name="accTechList" type="integer"/>
  </sequence>
</complexType>

<complexType name="UserMgmtOpen">
  <sequence>
      <element name="servAttrCom" type="sl:ServAttrCom"/>
      <element name="support" type="sl:UserMgmtOpenSupport"/>
  </sequence>
</complexType>

<complexType name="V2XCommMode">
  <sequence>
        <element name="servAttrCom" type="sl:ServAttrCom"/>
        <element name="v2XMode" type="sl:V2XCommModelsV2XMode"/>
  </sequence>
```

```
  </complexType>

  <complexType name="TermDensity">
    <sequence>
        <choice minOccurs="1" maxOccurs="1">
        <element name="servAttrCom" type="sl:ServAttrCom"/>
        <element name="density" type="integer"/>
        </choice>
    </sequence>
  </complexType>

  <complexType name="ServiceProfile">
    <sequence>
      <element name="serviceProfileId" type="string"/>
      <element name="sNSSAIList" type="ngc:SnssaiList"/>
      <element name="pLMNIdList" type="en:PLMNIdList"/>
      <element name="maxNumberofUEs" type="long" minOccurs="0"/>
      <element name="latency" type="integer" minOccurs="0"/>
      <element name="uEMobilityLevel" type="integer" minOccurs="0"/>
      <element name="resourceSharingLevel" type="integer" minOccurs="0"/>
      <element name="sst" type="ngc:Sst"/>
       <element name="availability" type="float" minOccurs="0"/>
      <element name="delayTolerance" type="sl:DelayTolerance" minOccurs="0"/>
      <element name="deterministicComm" type="sl:DeterminComm" minOccurs="0"/>
      <element name="dLThptPerSlice" type="sl:DLThpt" minOccurs="0"/>
      <element name="dLThptPerUE" type="sl:DLThpt" minOccurs="0"/>
      <element name="uLThptPerSlic" type="sl:ULThpt" minOccurs="0"/>
      <element name="uLThptPerUE" type="sl:ULThpt" minOccurs="0"/>
      <element name="maxPktSize" type="sl:MaxPktSize" minOccurs="0"/>
      <element name="maxNumberofConns" type="sl:MaxNumberofConns" minOccurs="0"/>
      <element name="kPIMonitoring" type="sl:KPIMonitoring" minOccurs="0"/>
      <element name="supportedAccessTech" type="sl:SupportedAccessTech" minOccurs="0"/>
      <element name="userMgmtOpen" type="sl:UserMgmtOpen" minOccurs="0"/>
      <element name="v2XCommModels" type="sl:V2XCommMode" minOccurs="0"/>
      <element name="coverageArea" type="string" minOccurs="0"/>
      <element name="termDensity" type="sl:TermDensity" minOccurs="0"/>
      <element name="activityFactor" type="float" minOccurs="0"/>
      <element name="uESpeed" type="integer" minOccurs="0"/>
      <element name="jitter" type="integer" minOccurs="0"/>
      <element name="survivalTime" type="string" minOccurs="0"/>
      <element name="reliability" type="string" minOccurs="0"/>
    </sequence>
  </complexType>
  <complexType name="ServiceProfileList">
    <sequence>
      <element name="serviceProfile" type="sl:ServiceProfile"/>
    </sequence>
  </complexType>

  <complexType name="SliceProfile">
    <sequence>
      <element name="sliceProfileId" type="string"/>
      <element name="sNSSAIList" type=" ngc:SnssaiList"/>
      <element name="pLMNIdList" type="en:PLMNIdList"/>
     <element name="perfReq" type="sl:PerfReq"/>
      <element name="maxNumberofUEs" type="long" minOccurs="0"/>
      <element name="coverageAreaTAList" type="ngc:NrTACList" minOccurs="0"/>
      <element name="latency" type="integer" minOccurs="0"/>
      <element name="uEMobilityLevel" type="sl:MobilityLevel" minOccurs="0"/>
      <element name="resourceSharingLevel" type="integer" minOccurs="0"/>

    </sequence>
  </complexType>
  <complexType name="SliceProfileList">
    <sequence>
      <element name="sliceProfile" type="sl:SliceProfile"/>
    </sequence>
  </complexType>
  <complexType name="NsInfo">
    <!-- Refer to definitions in subclause 8.3.3.2.2 of ETSI NFV IFA013 -->
    <sequence>
      <element name="nsInstanceId" type="string"/>
      <element name="nsName" type="string"/>
      <element name="description" type="string"/>
    </sequence>
  </complexType>

  <element name="NetworkSlice" substitutionGroup="xn:SubNetworkOptionallyContainedNrmClass">
```

```
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <element name="attributes">
              <complexType>
                <all>
                  <!-- Inherited attributes from SubNetwork -->
                  <element name="dnPrefix" type="string" minOccurs="0"/>
                  <element name="userLabel" type="string"/>
                  <element name="userDefinedNetworkType" type="string"/>
                  <element name="setOfMcc" type="string" minOccurs="0"/>
                  <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
                  <!-- End of inherited attributes from SubNetwork -->

                  <element name="operationalState" type="sm:operationalStateType"/>
                  <element name="administrativeState" type="sm:administrativeStateType"/>
                  <element name="serviceProfileList" type="sl:ServiceProfileList"/>
    <element name="networkSliceSubnetRef" type="xn:dn"/>
                </all>
              </complexType>
            </element>
            <choice minOccurs="0" maxOccurs="unbounded">
                <element ref="xn:MeasurementControl"/>
            </choice>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
  <element name="NetworkSliceSubnet" substitutionGroup="xn:SubNetworkOptionallyContainedNrmClass">
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <element name="attributes">
              <complexType>
                <all>
                  <!-- Inherited attributes from SubNetwork -->
                  <element name="dnPrefix" type="string" minOccurs="0"/>
                  <element name="userLabel" type="string"/>
                  <element name="userDefinedNetworkType" type="string"/>
                  <element name="setOfMcc" type="string" minOccurs="0"/>
                  <element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>
                  <!-- End of inherited attributes from SubNetwork -->

                  <element name="operationalState" type="sm:operationalStateType"/>
                  <element name="administrativeState" type="sm:administrativeStateType"/>
                  <element name="nsInfo" type="sl:NsInfo" minOccurs="0"/>
                  <element name="sliceProfileList" type="sl:SliceProfileList"/>
                 <element name="managedFunctionRef" type="xn:dnlist"/>
                  <element name="networkSliceSubnetRef" type="xn:dnlist"/>
                </all>
              </complexType>
            </element>
            <choice minOccurs="0" maxOccurs="unbounded">
                <element ref="xn:MeasurementControl"/>
            </choice>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
</schema>
```

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

J.1 General

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

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

Mapping rules to produce the OpenAPI definition based on the IS are defined in 3GPP TS 32.160 [14].

J.2 Void

J.3 Void

J.4 Solution Set (SS) definitions

J.4.1 Void

J.4.2 Void

J.4.3 OpenAPI document "sliceNrm.yaml"

```
openapi: 3.0.1
info:
  title: Slice NRM
  version: 16.4.0
  description: >-
    OAS 3.0.1 specification of the Slice NRM
    @ 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 28.541 V16.4.0; 5G NRM, Slice NRM
  url: http://www.3gpp.org/ftp/Specs/archive/28_series/28.541/
paths: {}
components:
  schemas:

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

    Float:
      type: number
      format: float
    MobilityLevel:
      type: string
      enum:
        - STATIONARY
```

```
      - NOMADIC
      - RESTRICTED MOBILITY
      - FULLY MOBILITY
    SharingLevel:
      type: string
      enum:
        - SHARED
        - NON-SHARED
    Category:
      type: string
      enum:
        - CHARACTER
        - SCALABILITY
    Tagging:
      type: string
      enum:
        - PERFORMANCE
        - FUNCTION
        - OPERATION
    Exposure:
      type: string
      enum:
        - API
        - KPI
    ServAttrCom:
      type: object
      properties:
        category:
          $ref: '#/components/schemas/Category'
        tagging:
          $ref: '#/components/schemas/Tagging'
        exposure:
          $ref: '#/components/schemas/Exposure'
    Support:
      type: string
      enum:
        - NOT SUPPORTED
        - SUPPORTED
    DelayTolerance:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        support:
          $ref: '#/components/schemas/Support'
    DeterministicComm:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        availability:
          $ref: '#/components/schemas/Support'
        periodicityList:
          type: string
    DLThptPerSlice:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        guaThpt:
          $ref: '#/components/schemas/Float'
        maxThpt:
          $ref: '#/components/schemas/Float'
    DLThptPerUE:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        guaThpt:
          $ref: '#/components/schemas/Float'
        maxThpt:
          $ref: '#/components/schemas/Float'
    ULThptPerSlice:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        guaThpt:
```

```
      $ref: '#/components/schemas/Float'
    maxThpt:
      $ref: '#/components/schemas/Float'
ULThptPerUE:
  type: object
  properties:
    servAttrCom:
      $ref: '#/components/schemas/ServAttrCom'
    guaThpt:
      $ref: '#/components/schemas/Float'
    maxThpt:
      $ref: '#/components/schemas/Float'
MaxPktSize:
  type: object
  properties:
    servAttrCom:
      $ref: '#/components/schemas/ServAttrCom'
    maxsize:
      type: integer
MaxNumberofConns:
  type: object
  properties:
    servAttrCom:
      $ref: '#/components/schemas/ServAttrCom'
    nOofConn:
      type: integer
KPIMonitoring:
  type: object
  properties:
    servAttrCom:
      $ref: '#/components/schemas/ServAttrCom'
    kPIList:
      type: string
SupportedAccessTech:
  type: object
  properties:
    servAttrCom:
      $ref: '#/components/schemas/ServAttrCom'
    accTechList:
      type: integer
UserMgmtOpen:
  type: object
  properties:
    servAttrCom:
      $ref: '#/components/schemas/ServAttrCom'
    support:
      $ref: '#/components/schemas/Support'
V2XCommModels:
  type: object
  properties:
    servAttrCom:
      $ref: '#/components/schemas/ServAttrCom'
    v2XMode:
      $ref: '#/components/schemas/Support'
TermDensity:
  type: object
  properties:
    servAttrCom:
      $ref: '#/components/schemas/ServAttrCom'
    density:
      type: integer
NsInfo:
  type: object
  properties:
    nsInstanceId:
      type: string
    nsName:
      type: string
ServiceProfileList:
  type: object
  additionalProperties:
    type: object
    properties:
      snssaiList:
        $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
      plmnIdList:
        $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
      maxNumberofUEs:
```

```
            type: number
          latency:
            type: number
          uEMobilityLevel:
            $ref: '#/components/schemas/MobilityLevel'
          sst:
            $ref: 'nrNrm.yaml#/components/schemas/Sst'
          resourceSharingLevel:
            $ref: '#/components/schemas/SharingLevel'
          availability:
            type: number
          delayTolerance:
            $ref: '#/components/schemas/DelayTolerance'
          deterministicComm:
            $ref: '#/components/schemas/DeterministicComm'
          dLThptPerSlice:
            $ref: '#/components/schemas/DLThptPerSlice'
          dLThptPerUE:
            $ref: '#/components/schemas/DLThptPerUE'
          uLThptPerSlice:
            $ref: '#/components/schemas/ULThptPerSlice'
          uLThptPerUE:
            $ref: '#/components/schemas/ULThptPerUE'
          maxPktSize:
            $ref: '#/components/schemas/MaxPktSize'
          maxNumberofConns:
            $ref: '#/components/schemas/MaxNumberofConns'
          kPIMonitoring:
            $ref: '#/components/schemas/KPIMonitoring'
          supportedAccessTech:
            $ref: '#/components/schemas/SupportedAccessTech'
          userMgmtOpen:
            $ref: '#/components/schemas/UserMgmtOpen'
          v2XModels:
            $ref: '#/components/schemas/V2XCommModels'
          coverageArea:
            type: string
          termDensity:
            $ref: '#/components/schemas/TermDensity'
          activityFactor:
            $ref: '#/components/schemas/Float'
          uESpeed:
            type: integer
          jitter:
            type: integer
          survivalTime:
            type: string
          reliability:
            type: string
    SliceProfileList:
      type: object
      additionalProperties:
        type: object
        properties:
          snssaiList:
            $ref: 'nrNrm.yaml#/components/schemas/SnssaiList'
          plmnIdList:
            $ref: 'nrNrm.yaml#/components/schemas/PlmnIdList'
          maxNumberofUEs:
            type: number
          coverageAreaTAList:
            $ref: '5gcNrm.yaml#/components/schemas/TACList'
          latency:
            type: number
          uEMobilityLevel:
            $ref: '#/components/schemas/MobilityLevel'
          resourceSharingLevel:
            $ref: '#/components/schemas/SharingLevel'

    IpAddress:
      oneOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Ipv4Addr'
        - $ref: 'genericNrm.yaml#/components/schemas/Ipv6Addr'

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

    NetworkSlice:
      allOf:
```

```
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNrm.yaml#/components/schemas/SubNetwork-Attr'
                - type: object
                  properties:
                    networkSliceSubnetRef:
                      $ref: 'genericNrm.yaml#/components/schemas/Dn'
                    operationalState:
                      $ref: 'genericNrm.yaml#/components/schemas/OperationalState'
                    administrativeState:
                      $ref: 'genericNrm.yaml#/components/schemas/AdministrativeState'
                    serviceProfileList:
                      $ref: '#/components/schemas/ServiceProfileList'

    NetworkSliceSubnet:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'genericNrm.yaml#/components/schemas/SubNetwork-Attr'
                - type: object
                  properties:
                    managedFunctionRefList:
                      $ref: 'genericNrm.yaml#/components/schemas/DnList'
                    networkSliceSubnetRefList:
                      $ref: 'genericNrm.yaml#/components/schemas/DnList'
                    operationalState:
                      $ref: 'genericNrm.yaml#/components/schemas/OperationalState'
                    administrativeState:
                      $ref: 'genericNrm.yaml#/components/schemas/AdministrativeState'
                    nsInfo:
                      $ref: '#/components/schemas/NsInfo'
                    sliceProfileList:
                      $ref: '#/components/schemas/SliceProfileList'
            EPTransport:
             $ref: '#/components/schemas/EP_Transport-Multiple'

    EP_Transport-Single:
      allOf:
        - $ref: 'genericNrm.yaml#/components/schemas/Top-Attr'
        - type: object
          properties:
            attributes:
              type: object
              properties:
                ipAddress:
                  $ref: '#/components/schemas/IpAddress'
                logicInterfaceId:
                  type: string
                nextHopInfo:
                  type: string
                qosProfile:
                  type: string

    EP_Transport-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_Transport-Single'

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

    resources-sliceNrm:
      oneOf:
       - $ref: '#/components/schemas/NetworkSlice'
       - $ref: '#/components/schemas/NetworkSliceSubnet'
```

Annex K (normative):
Void

Annex L (normative): Relation of GSMA GST, ServiceProfile and SliceProfile

L.1 General

This annex describes the relation between GSMA GST[50] and information model `ServiceProfile` and `SliceProfile`.

L.2 GSMA GST, ServiceProfile and sliceProfile

The GSMA GST is used as the SLA information for the communication between the vertical industry and the communication service provider. The SLA requirements can be fulfilled from management aspect and control aspect in a coordinated way. The SLS includes `ServiceProfile` information model.

As shown in figure L.2.1, the GST [50] is translated and used as input to NRM `ServiceProfile`, the `ServiceProfile` can be translated to corresponding requirements for dedicated domains. For example, 5GC `SliceProfile` is used to carry 5GC domain requirements, NG-RAN `SliceProfile` is used to carry NG-RAN domain requirements, and TN requirements are translated and provide to TN domain. Some of the information in 5GC `SliceProfile` and NG-RAN `SliceProfile` translated to configurable parameters of network function for the control plane SLA support purpose.

NOTE: how to do the translation is out of the scope of this document.

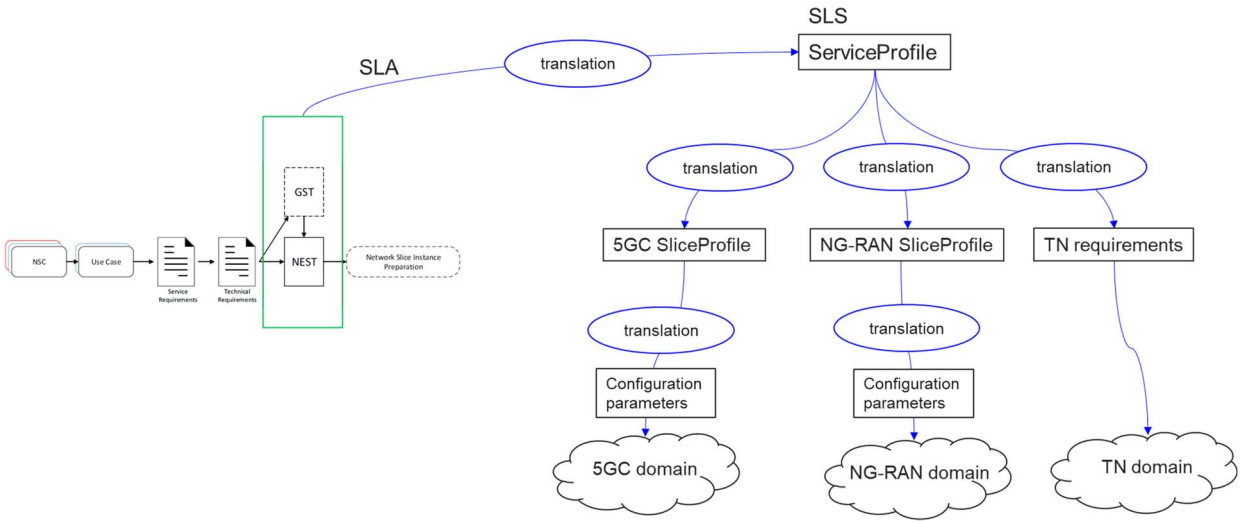

Figure L.2.1 Relation between GSMA GST, ServiceProfile and SliceProfile

Annex L (normative): Managed NF Service state handling

L.1 Combined state diagram for a Managed NF Service

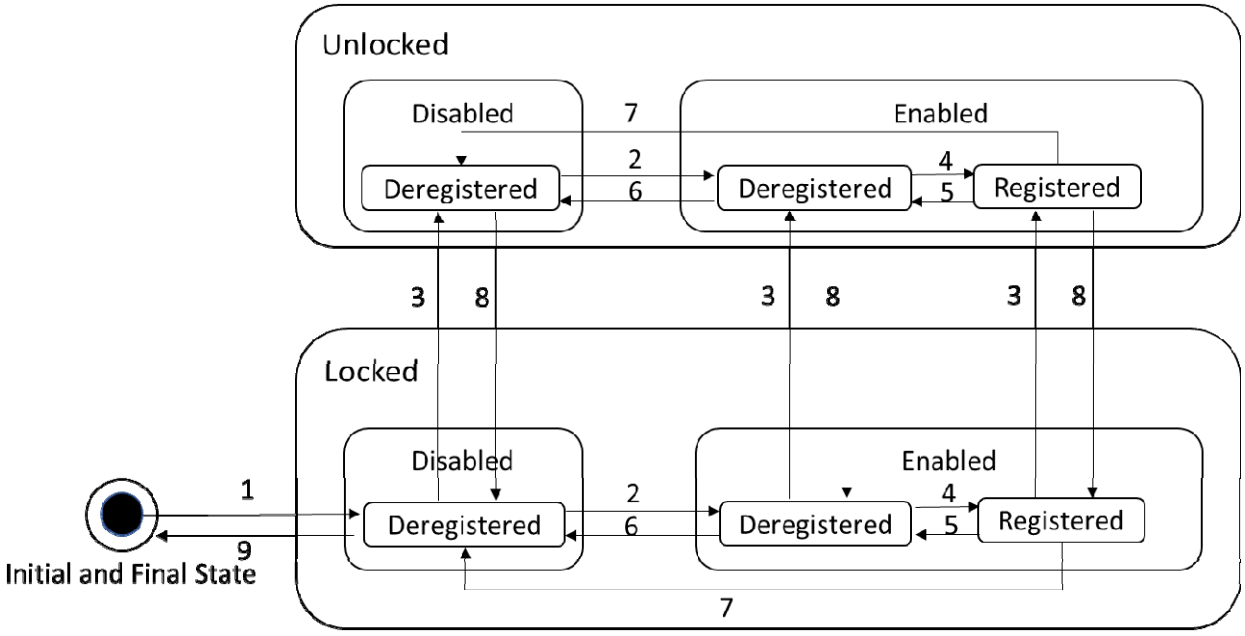

Figure L.1-1: Combined Managed NF Service state diagram

Table L.1-1: The Managed NF Service state transition table

Trigger number	The state transition events and actions
1	Event: Received information of deployment of a Network Function (NF) service. Action: Create a ManagedNFService instance (MSI) whose(Administrative/Operational/Registration) are set to Locked/Disabled/Deregistered.
2	Event: Received information of positive state change of the NF service. Action: Set the Operational state of the MSI to Enabled.
3	Event: Received CM operation to unlock the NF Service or the NF. Action: Set the Administrative state of the MSI to Unlocked. Note: Changing Administrative state on NF service level is optional
4	Event: Received information that the NF Service is registered to an NRF either by the NF itself or by an OAM system on behalf of the NF. Action: Set the registration state of the MSI to Registered.
5	Event: Received information that the NF Service is deregistered from the NRF either by the NF itself or by an OAM system on behalf of the NF. Action: Set registration state of the MSI to Deregistered.
6	Event: Received information that the NF Service is unavailable because of, for example, limitation of resource or other exceptions. Action: Set the Operational state of the MSI to Disabled.
7	Event: Received information that the NF Service is unavilable. Action: Deregister the NF Service on behalf of the NF, and set the registration state of the MSI to Deregistered.
8	Event: Received CM operation to lock the NF Service or the NF. Action: Set the Administrative state of the MSI to Locked. Note: Changing Administrative state on NF service level is optional
9	Event: Received information that the NF Service is terminated or deleted, Action: Delete the MSI and set its state to NULL.

Annex M (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2018-09	SA#81					Upgrade to change control version	15.0.0
2018-09	SA#81					EdiHelp review	15.0.1
2018-12	SA#82	SP-181046	0001	1	F	Fix issues raised by EditHelp	15.1.0
2018-12	SA#82	SP-181046	0002	2	F	Update NR Stage 2 definition to align with TS 37.340 for MR-DC	15.1.0
2018-12	SA#82	SP-181046	0003	1	F	Update NRM Stage 2 defintion to align with TS 23.501 for 5G architecture	15.1.0
2018-12	SA#82	SP-181046	0005	1	F	Update Stage 3 XML definition of NR to align with Stage 2 content	15.1.0
2018-12	SA#82	SP-181046	0006	1	F	Update Stage 3 JSON definition of NR to align with Stage 2 content	15.1.0
2018-12	SA#82	SP-181046	0007	1	F	Update Stage 3 YANG definition of NR to align with Stage 2 content	15.1.0
2018-12	SA#82	SP-181046	0008	1	F	Update Stage 3 XML definition of 5GC to align with Stage 2 content	15.1.0
2018-12	SA#82	SP-181046	0009	1	F	Update Stage 3 JSON definition of 5GC to align with Stage 2 content	15.1.0
2018-12	SA#82	SP-181046	0011	1	F	Update stage 3 XML definition of NS to align with Stage 2 content	15.1.0
2018-12	SA#82	SP-181046	0012	1	F	Update Stage 3 JSON definition of NS to align with Stage 2 content	15.1.0
2018-12	SA#82	SP-181046	0013	1	F	Update stage 3 YANG definition of NS to align with Stage 2 content	15.1.0
2018-12	SA#82	SP-181046	0014	1	F	Correct the term sNSSAIList and nRTAClist	15.1.0
2018-12	SA#82	SP-181046	0015	1	F	Update the inheritance hierarchy figure for NR NRM to include BWP IOC and NRSectorCarrier IOC	15.1.0
2018-12	SA#82	SP-181046	0016	1	F	Change the term nCGI to nCI	15.1.0
2018-12	SA#82	SP-181046	0019	1	F	Align properties of cell state	15.1.0
2018-12	SA#82	SP-181046	0021	1	F	Add missing attribute definition and condition	15.1.0
2018-12	SA#82	SP-181047	0022	1	F	Add missing detail definition for attribute	15.1.0
2018-12	SA#82	SP-181047	0023	1	F	Adding missing attribute, and correction of reference	15.1.0
2018-12	SA#82	SP-181043	0025	-	F	Remove NSSF from the abbrevations	15.1.0
2018-12	SA#82	SP-181046	0027	-	F	Replace symbol for network slice state management	15.1.0
2018-12	SA#82	SP-181046	0031	1	F	Remove the ExternalENBFunction definition	15.1.0
2018-12	SA#82	SP-181046	0033	1	F	Align the management of external function and cell with TS 28.658	15.1.0
2018-12	SA#82	SP-181156	0034	1	F	Update NR NRM with Cell Relation	15.1.0
2018-12	SA#82	SP-181156	0038	3	F	RRM Policy enhancements	15.1.0
2018-12	SA#82	SP-181156	0039	1	F	Fix containment issue in YANG definition	15.1.0
2018-12	SA#82	SP-181156	0040	-	F	Implement minor corrections	15.1.0
2018-12	SA#82	SP-181042	0041	-	F	Update Stage 3 NRM for RRM Policy enhancements	15.1.0
2019-03	SA#83	SP-190121	0043	1	F	Align NR attributes definition related to SSB with corresponding NG-RAN IE definition	15.2.0
2019-03	SA#83	SP-190121	0044	1	F	Correct the use of nCI and PLMN	15.2.0
2019-03	SA#83	SP-190121	0045	-	F	Remove duplicate definition for ExternalNRCellCU	15.2.0
2019-03	SA#83	SP-190121	0046	2	F	Correct class diagram for view on external entities	15.2.0
2019-03	SA#83	SP-190121	0047	1	F	Correct the definition for resourceSharingLevel	15.2.0
2019-03	SA#83	SP-190121	0048	1	F	Correction of references	15.2.0
2019-03	SA#83	SP-190121	0052	1	F	Align the term mFIdList and constituentNSSIIdList	15.2.0
2019-03	SA#83	SP-190121	0053	1	F	Correct the definition of nSSIId	15.2.0
2019-03	SA#83	SP-190121	0054	1	F	Add missing attribute constraint for class definition of NSSFFunction	15.2.0
2019-03	SA#83	SP-190121	0055	1	F	Correct attribute constraints for RRMpolicy related attributes in NRCellCU	15.2.0
2019-03	SA#83	SP-190121	0057	-	F	Correct cardinality of End Point (EP) to target	15.2.0
2019-03	SA#83	SP-190121	0058	0	F	Correct Import table	15.2.0
2019-03	SA#83	SP-190121	0059	-	F	Remove ExternalNRCellCU.pLMNIdList	15.2.0
2019-03	SA#83	SP-190121	0060	-	F	Use 'bS' (not 'bs') to prefix all BS (base station) attributes	15.2.0
2019-03	SA#83	SP-190121	0061	1	F	Correction of State attributes descriptions	15.2.0

2019-03	SA#83	SP-190121	0062	-	F	Update 5G JSON Solution Set to align with generic NRM	15.2.0
2019-03	SA#83	SP-190121	0063	1	F	Update YANG Solution Set to align with Stage 2 definition	15.2.0
2019-03	SA#83	SP-190121	0064	1	F	Update Information Service to fix Network Slice modeling issue	15.2.0
2019-03	SA#83	SP-190121	0065	1	F	Update Solution Set to fix Network Slice modeling issue	15.2.0
2019-03	SA#83	SP-190121	0066	1	F	Add availability in service profile of network slice resource model	15.2.0
2019-03	SA#83	SP-190121	0068	1	F	Add sST attribute to ServiceProfile	15.2.0
2019-03	SA#83	SP-190121	0069	1	F	Update to sST attribute stage 3	15.2.0
2019-03	SA#83	SP-190149	0073	2	F	Replace CoverageAreaTAList type definition	16.0.0
2019-03	SA#83	SP-190149	0074	1	F	Name datatypes SliceProfile and ServiceProfile	16.0.0
2019-03	SA#83	SP-190149	0075	1	F	Add datatype definition for S-NSSAI	16.0.0
2019-03	SA#83	SP-190149	0076	1	F	Remove incomplete description for TAC	16.0.0
2019-03	SA#83	SP-190149	0079	1	F	Name datatype RRMPolicyRatio2	16.0.0
2019-06	SA#84	SP-190374	0083	-	A	Remove attribute availabilityStatus in NRCellDU IOC	16.1.0
2019-06	SA#84	SP-190373	0085	1	F	Correct the definition for nsInfo	16.1.0
2019-06	SA#84	SP-190374	0088	1	A	Update Information Service of NR to fix unclear Note issue	16.1.0
2019-06	SA#84	SP-190373	0096	2	A	Correct the use of plmnIdList	16.1.0
2019-06	SA#84	SP-190373	0098	1	F	Add missing clauses to RRMPolicyRatio2 data type	16.1.0
2019-06	SA#84	SP-190373	0099	1	F	Update RRMPolicyRatio2 data type name in stage 3	16.1.0
2019-06	SA#84	SP-190373	0102	-	F	Fix the implementation errors	16.1.0
2019-09	SA#85	SP-190745	0089	2	B	Update 5GC Information Service to align with Managed Service Definition	16.2.0
2019-09	SA#85	SP-190743	0107	1	A	Correct description for NR deployment scenario	16.2.0
2019-09	SA#85	SP-190743	0109	1	A	Correct NR NRM model to be applicable for all NG-RAN architecture	16.2.0
2019-09	SA#85	SP-190745	0114	1	C	Support NF Profile management	16.2.0
2019-09	SA#85	SP-190743	0121	1	A	Clarification of sNSSAIList attribute	16.2.0
2019-09	SA#85	SP-190744	0123	-	A	Remove pLMNId from GNBDUFunction	16.2.0
2019-09	SA#85	SP-190743	0126	2	A	Update class definition with inheritance information	16.2.0
2019-09	SA#85	SP-190743	0128	1	A	Correct description of NRCellCU and NRCellDU to be applicable for all deployment scenarios	16.2.0
2019-09	SA#85	SP-190743	0130	-	A	Correct XML solution set for NR	16.2.0
2019-09	SA#85	SP-190743	0132	-	A	Correct XML solution set for Network slice	16.2.0
2019-09	SA#85	SP-190750	0133	1	F	Clarification on slice model	16.2.0
2019-09	SA#85	SP-190743	0142	1	A	Add YANG mount info	16.2.0
2019-09	SA#85	SP-190743	0143	-	A	Add YANG solution	16.2.0
2019-09	SA#85	SP-190745	0149	1	F	generate JSON definition for 5GC NRM based on new style guideline	16.2.0
2019-09	SA#85	SP-190744	0150	1	A	Fix NR NRM to add missed ID info	16.2.0
2019-09	SA#85	SP-190744	0152	-	F	XML Solution Set for 5GC	16.2.0
2019-09	SA#85	SP-190744	0154	-	A	Correct ETSI NFV reference	16.2.0
2019-09	SA#85	SP-190744	0157	1	A	generate JSON definition for Slice NRM based on new style guideline	16.2.0
2019-09	SA#85	SP-190744	0158	1	A	generate JSON definition for NR NRM based on new style guideline	16.2.0
2019-12	SA#86	SP-191159	0146	3	F	To syn up with v1540 stage 2	16.3.0
2019-12	SA#86	SP-191173	0156	2	A	Correct Import table	16.3.0
2019-12	SA#86	SP-191166	0161	1	C	Extensions to PCF and UPF IOCs for support of TSC (Time Sensitive Communication)	16.3.0
2019-12	SA#86	SP-191166	0166	1	F	Correct XML solution set for NR	16.3.0
2019-12	SA#86	SP-191166	0167	1	F	Correct Network slice NRM	16.3.0
2019-12	SA#86	SP-191173	0168	2	A	Correct NR TAC attribute property	16.3.0
2019-12	SA#86	SP-191173	0170	-	A	Correction of the duplicated IOC NSSFFunction in daigram	16.3.0
2019-12	SA#86	SP-191173	0172	-	A	Correction of the wrong IOC names in transport view diagram---Not implemented, wrong baseline (MCC)	16.3.0
2019-12	SA#86	SP-191166	0175	2	F	XML Solution Set for 5GC	16.3.0
2019-12	SA#86	SP-191170	0177	3	C	Update on slice NRM	16.3.0
2019-12	SA#86	SP-191170	0178	2	B	Add relation of GST and profiles	16.3.0
2019-12	SA#86	SP-191166	0180	3	F	Update SEPP Stage 2 definition in 5GC NRM	16.3.0
2019-12	SA#86	SP-191166	0182	1	C	Add NEF Stage 2 definition in 5GC NRM	16.3.0

2019-12	SA#86	SP-191166	0184	1	C	Add SCP Stage 2 definition in 5GC NRM	16.3.0
2019-12	SA#86	SP-191166	0185	-	C	Add Stage 3 definitions of 5GC NRM to align with stage 2	16.3.0
2019-12	SA#86	SP-191166	0186	1	C	Support communication model in 5GC NF - Stage 2	16.3.0
2019-12	SA#86	SP-191166	0192	1	F	Fix merging errors of the specification	16.3.0
2019-12	SA#86	SP-191166	0195	-	C	Add State Handling diagram for NF service	16.3.0
2019-12	SA#86	SP-191166	0197	-	B	Updates to YANG SS	16.3.0
2019-12	SA#86	SP-191170	0198	1	C	Update XML definitions of ServiceProfile NRM	16.3.0
2019-12	SA#86	SP-191170	0199	2	C	Update JSON definitions of ServiceProfile NRM	16.3.0
2019-12	SA#86	SP-191166	0200	1	C	Add managedNFProfile definition for ngc NRM - stage3	16.3.0
2019-12	SA#86	SP-191166	0202	2	B	Add the RIM monitoring parameters for remote interference management	16.3.0
2019-12	SA#86	SP-191166	0212	2	F	Correct Network slice NRM	16.3.0
2019-12	SA#86	SP-191166	0213	-	F	Update SEPP Stage 3 definition in 5GC NRM	16.3.0
2019-12	SA#86	SP-191180	0222	2	B	Management of NR ANR, Stage 2	16.3.0
2019-12	SA#86	SP-191180	0223	-	B	Management of NR ANR, Stage 3	16.3.0
2019-12	SA#86	SP-191173	0226	1	A	Add Stages 2 NRM Info Model definitions for beam managed object classes	16.3.0
2019-12	SA#86	SP-191173	0227	-	A	Add Stages 2 NRM Info Model definitions for beam managed object classes	16.3.0
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2020-03	SA#87E	SP-200169	0179	3	C	Update of RRM Policy	16.4.0
2020-03	SA#87E	SP-200169	0235	-	F	Correction of reference	16.4.0
2020-03	SA#87E	SP-200169	0239	1	F	Update the NR NRM to align with NG-RAN overview architecture	16.4.0
2020-03	SA#87E	SP-200169	0241	-	F	Some correction on the NR NRM	16.4.0
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2020-03	SA#87E	SP-200178	0254	1	F	Correct CR implementation errors	16.4.0
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History

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