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TECHNICAL SPECIFICATION

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Stage 2 and stage 3
(3GPP TS 28.541 version 17.8.1 Release 17)

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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z the third digit is incremented when editorial only changes have been incorporated in the document.

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shall indicates a mandatory requirement to do something

shall not indicates an interdiction (prohibition) to do something

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should indicates a recommendation to do something

should not indicates a recommendation not to do something

may indicates permission to do something

need not indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

can indicates that something is possible

cannot indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

will indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

will not indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

might indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

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 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 3.0 (2020-05-22).

[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)".

[59] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".

[60] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".

[61] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[62] 3GPP TS 29.214: "Policy and Charging Control over Rx reference point".

[63] IETF RFC 7042: "IANA Considerations and IETF Protocol and Documentation Usage for IEEE 802 Parameters".

[64] IEEE 802.3-2015: "IEEE Standard for Ethernet".

[65] IEEE 802.1Q-2014: "Bridges and Bridged Networks".

[66] IETF RFC 4301: "Security Architecture for the Internet Protocol".

[67] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[68] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".

[69] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[70] 3GPP TS 28.530: "Management and orchestration; Concepts, use cases and requirements".

[71] 3GPP TS 28.310: "Management and orchestration; Energy efficiency of 5G".

[72] 3GPP TS 28.705: "Telecommunication management; IP Multimedia Subsystem (IMS) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[73] 3GPP TS 23.304: " Proximity based Services (ProSe) in the 5G System".

[74] IETF RFC 8436: " Update to IANA Registration Procedures for Pool 3 Values in the Differentiated Services Field Codepoints (DSCP) Registry".

[75] ECMA-262: "ECMAScript® Language Specification", https://www.ecma-international.org/ecma-262/5.1/.

[76] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[77] IANA: "SMI Network Management Private Enterprise Codes", http://www.iana.org/assignments/enterprise-numbers.

[78] 3GPP TS 23.548:" 5G System Enhancements for Edge Computing; Stage 2".

[79] 3GPP TS 28.538: "Edge Computing Management".

[80] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[81] 3GPP TS 23.558: "Architecture for enabling Edge Applications".

[82] IETF RFC 5952: "A recommendation for IPv6 address text representation".

[83] IETF RFC 8299: "YANG Data Model for L3VPN Service Delivery".

[84] IETF RFC 8466: "A YANG Data Model for Layer 2 Virtual Private Network (L2VPN) Service Delivery".

3 Definitions of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in TR 21.905 [1], 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 TR 21.905 [1] and TS 28.540 [10].

3.2 Symbols

void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1], TS 23.501 [2], TS 38.401 [4], 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 TR 21.905 [1] , TS 23.501 [2], TS 38.401 [4] and TS 28.540 [10].

BWP Bandwidth part
CHO Conditional Handover
CM Configuration Management
DAPS Dual Active Protocol Stack
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.

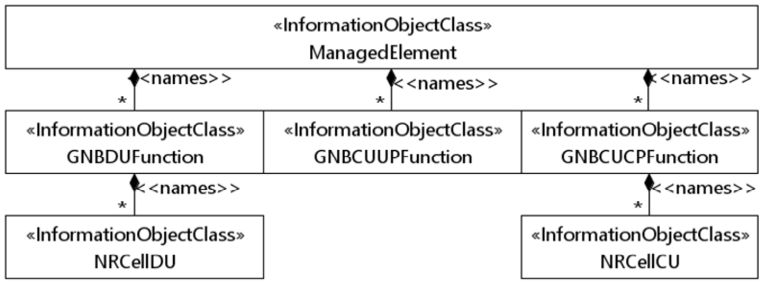


Figure 4.2.1.1-1: NRM for all deployment scenarios

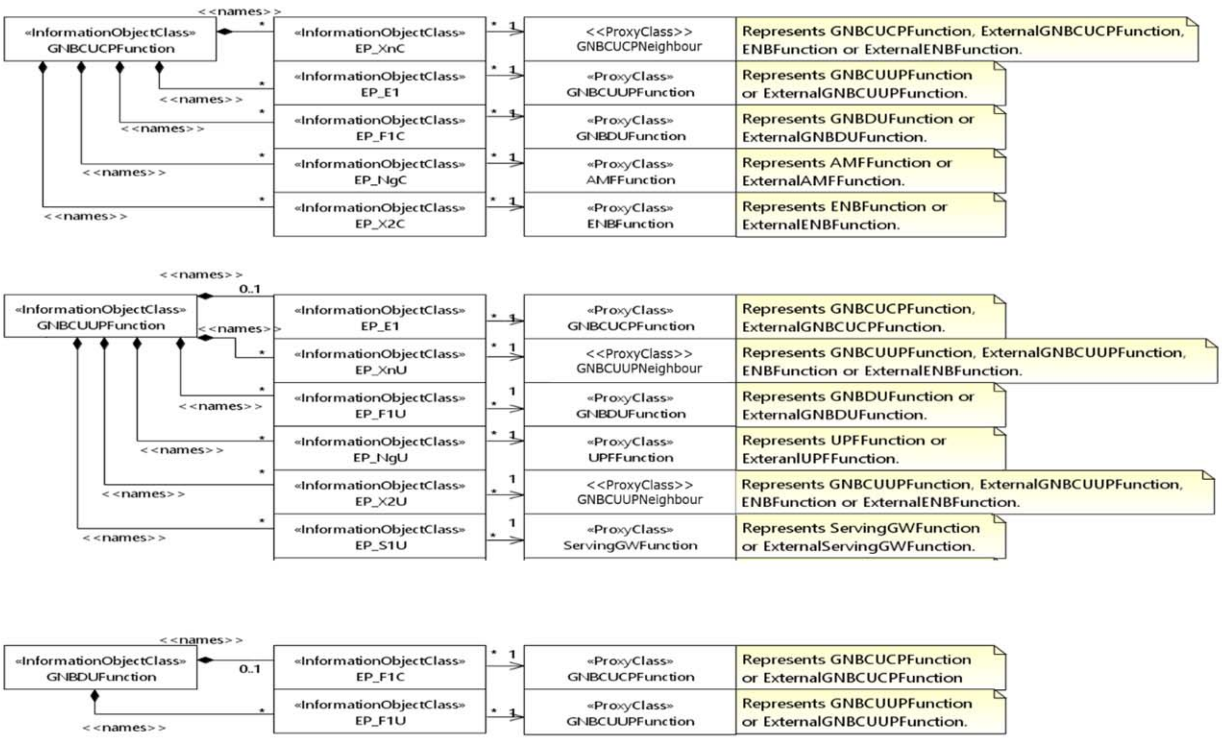


Figure 4.2.1.1-2: NRM for EPs for all deployment scenarios

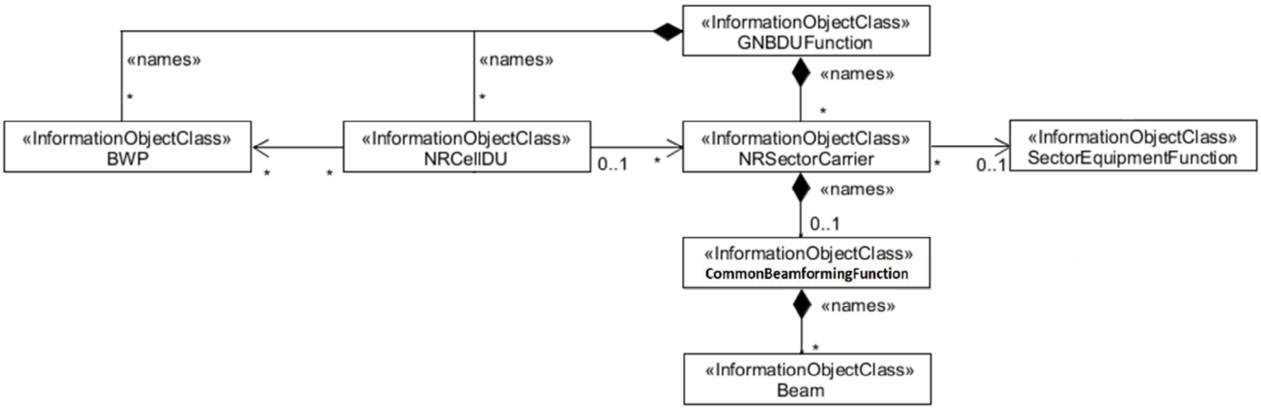


Figure 4.2.1.1-3: NRM for <<IOC>>`NRSectorCarrier` and <<IOC>>`BWP` for all deployment scenarios

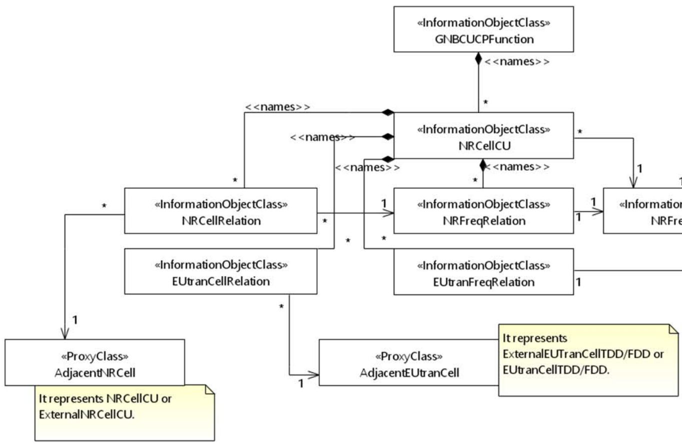


Figure 4.2.1.1-4: Cell Relation view for all deployment scenarios

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

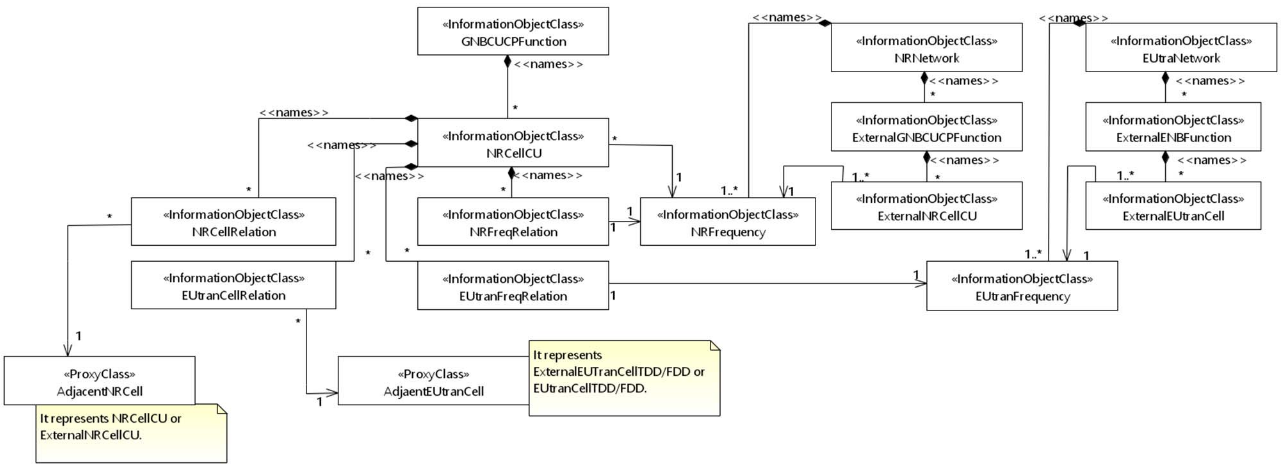


Figure 4.2.1.1-5: Cell Relation view for all deployment scenarios

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.

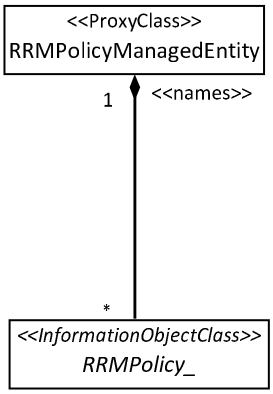


Figure 4.2.1.1-6: NRM fragment for abstract RRM Policies

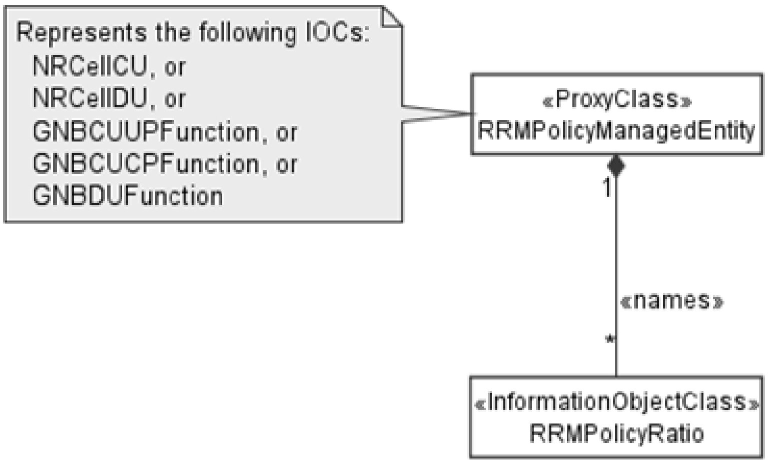


Figure 4.2.1.1-6a: NRM fragment for RRMPolicyRatio

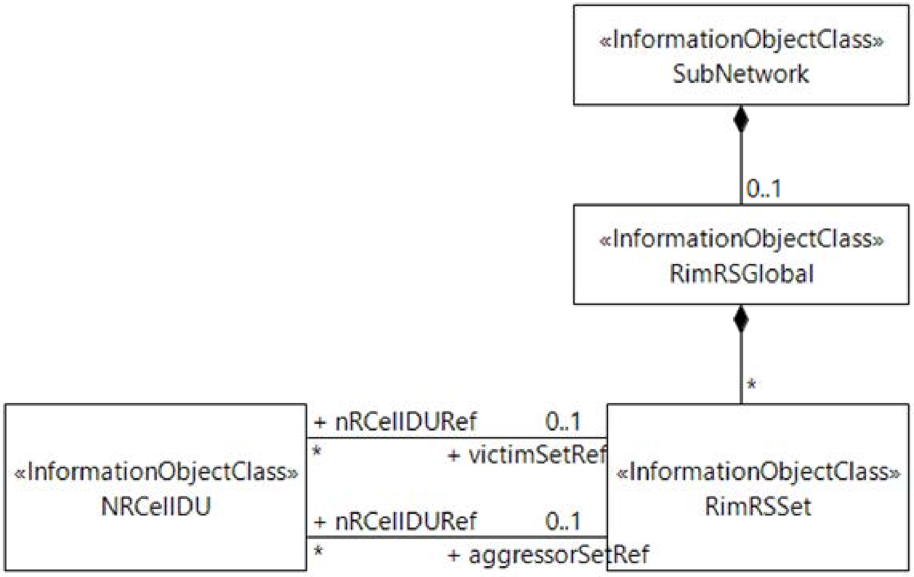


Figure 4.2.1.1-7: NRM fragment to support RIM

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

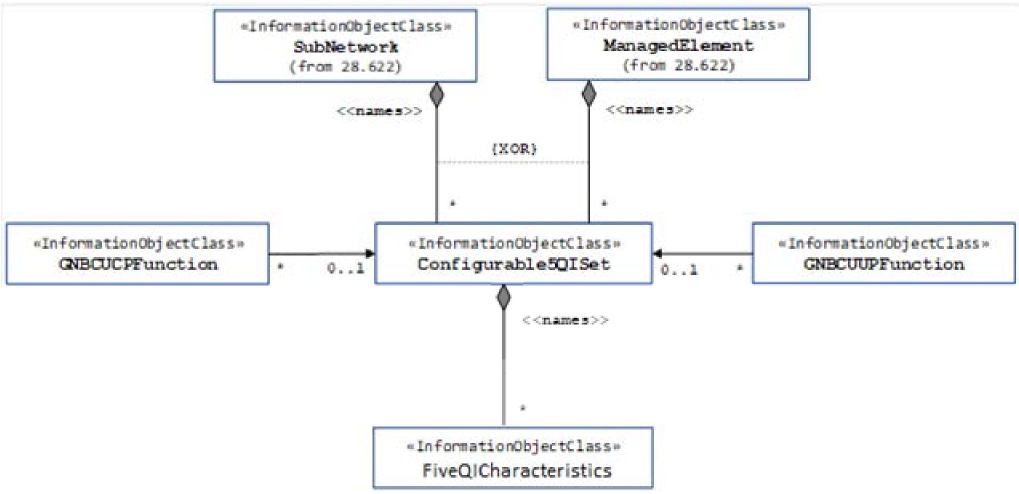


Figure 4.2.1.1-8: NRM fragment for pre-configured 5QIs in NG-RAN

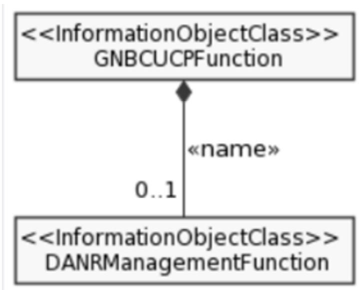


Figure 4.2.1.1-9: NRM fragment for DANR Management

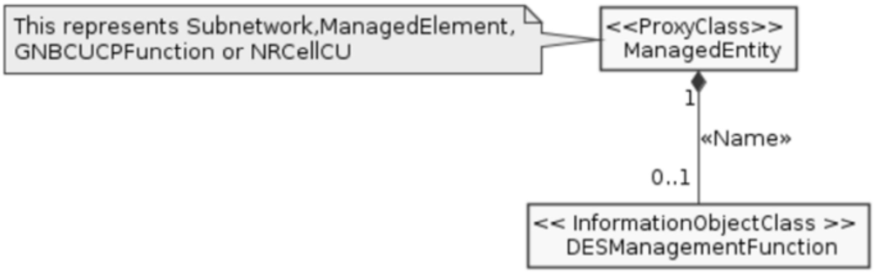


Figure 4.2.1.1-10: NRM fragment for DES Management

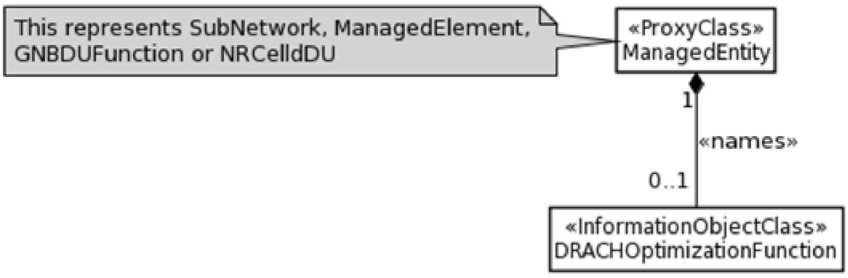


Figure 4.2.1.1-11: NRM fragment for DRACH Management

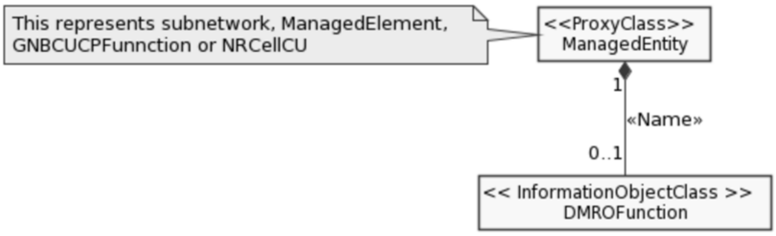


Figure 4.2.1.1-12: NRM fragment for DMRO Management

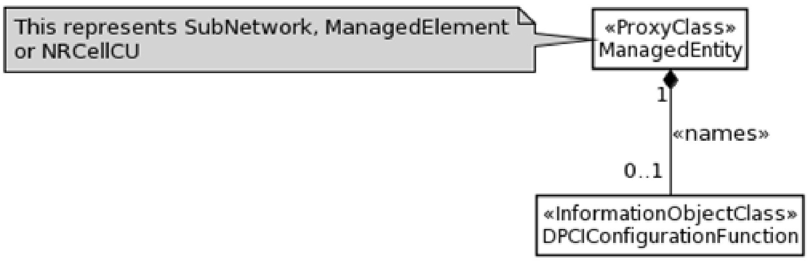


Figure 4.2.1.1-13: NRM fragment for DPCI Management

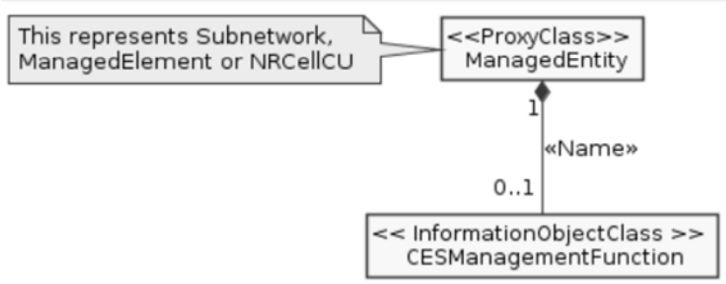


Figure 4.2.1.1-14: NRM fragment for CES Management

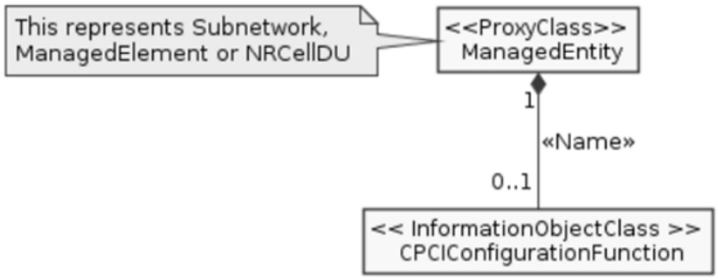


Figure 4.2.1.1-15: NRM fragment for CPCI Management

The Figure 4.2.1.1-16 shows the NRM fragment for dynamic 5QIs in NG-RAN.

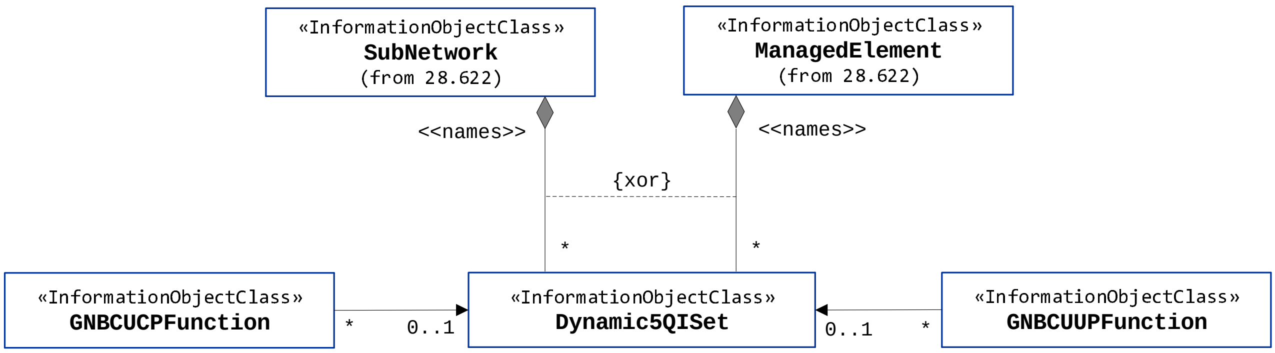


Figure 4.2.1.1-16: NRM fragment for dynamically assigned 5QIs in NG-RAN

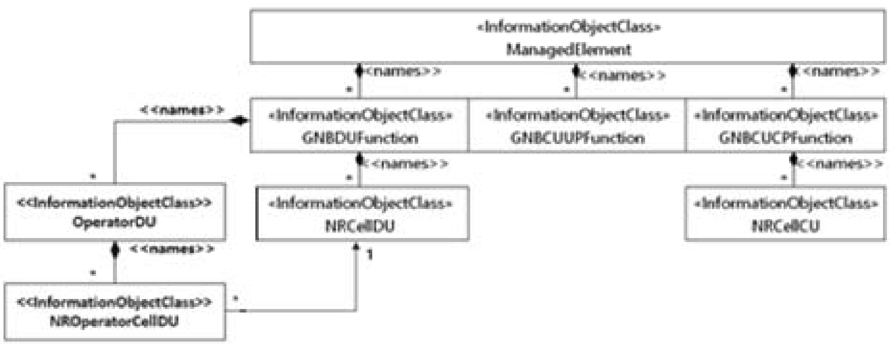


Figure 4.2.1.1-17: NRM NG-RAN MOCN network sharing with multiple cell identity

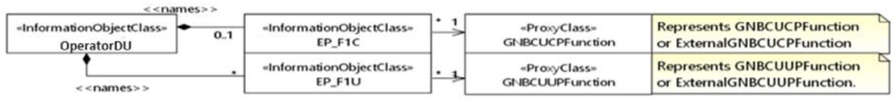


Figure 4.2.1.1-18: NRM for F1 related EPs to support individual F1 interface for NG-RAN MOCN network sharing with multiple cell identity broadcast scenario

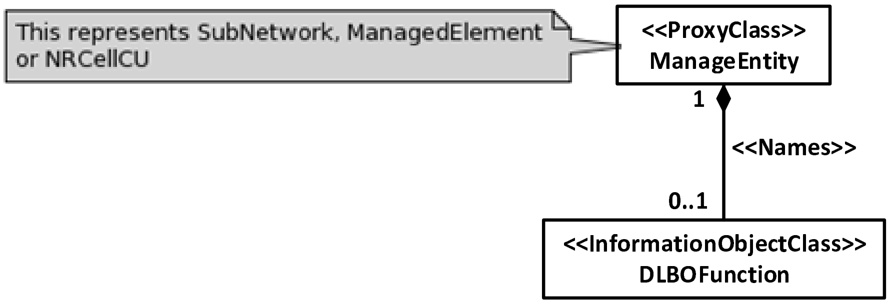


Figure 4.2.1.1-19: NRM fragment for DLBO Management

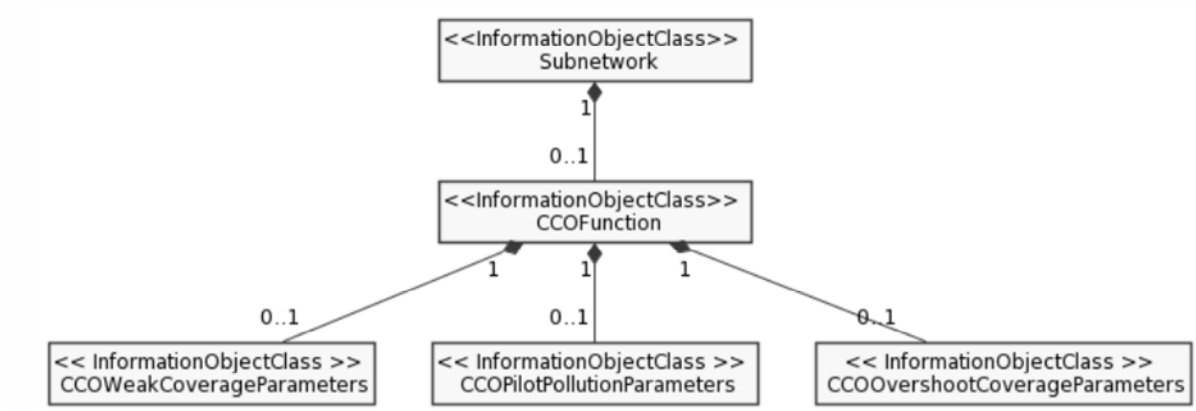
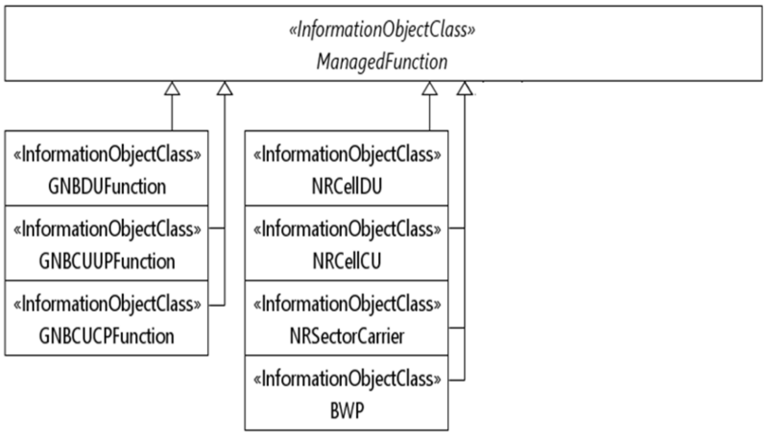
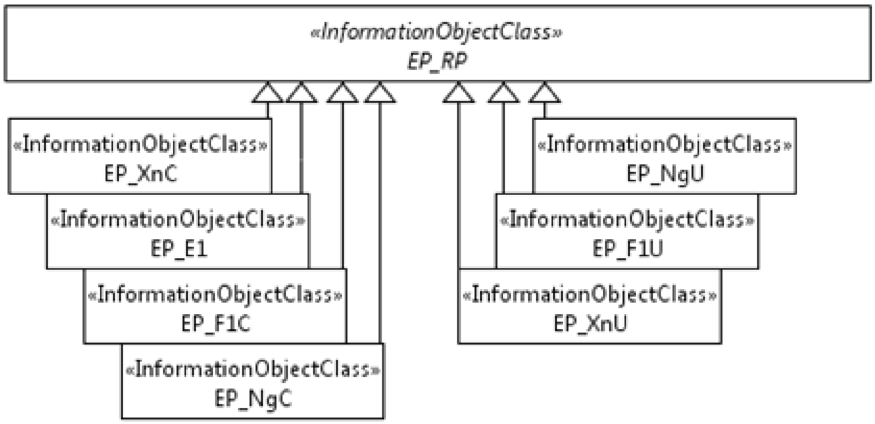
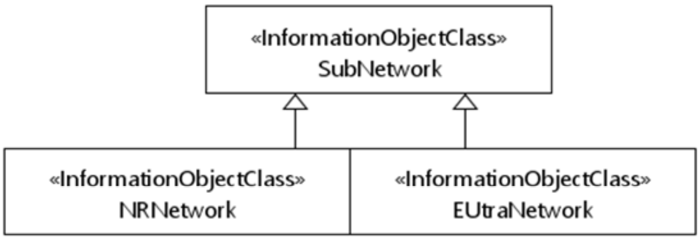


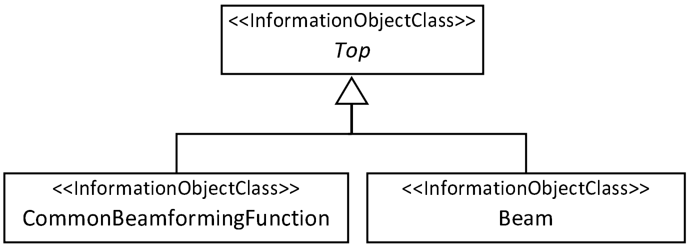
Figure 4.2.1.1-20: NRM fragment for CCO Management

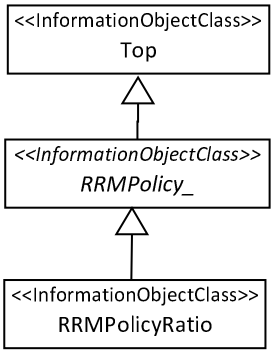
4.2.1.2 Inheritance

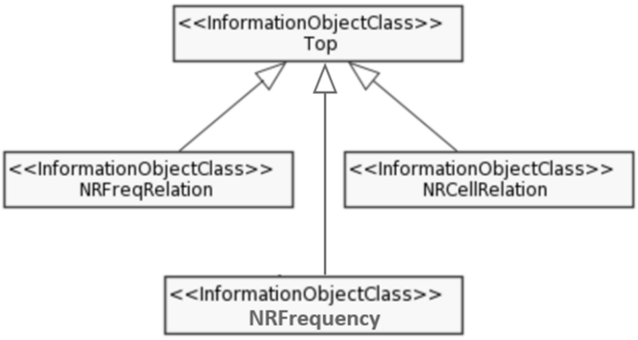





«InformationObjectClass»
SubNetwork
«InformationObjectClass»
NRNetwork
«InformationObjectClass»
EUtraNetwork


<<InformationObjectClass>>
Top
<<InformationObjectClass>>
CommonBeamformingFunction
<<InformationObjectClass>>
Beam


<<InformationObjectClass>>
Top
<<InformationObjectClass>>
RRMPolicy_
<<InformationObjectClass>>
RRMPolicyRatio


<<InformationObjectClass>>
Top
<<InformationObjectClass>>
NRFreqRelation
<<InformationObjectClass>>
NRCellRelation
<<InformationObjectClass>>
NRFrequency

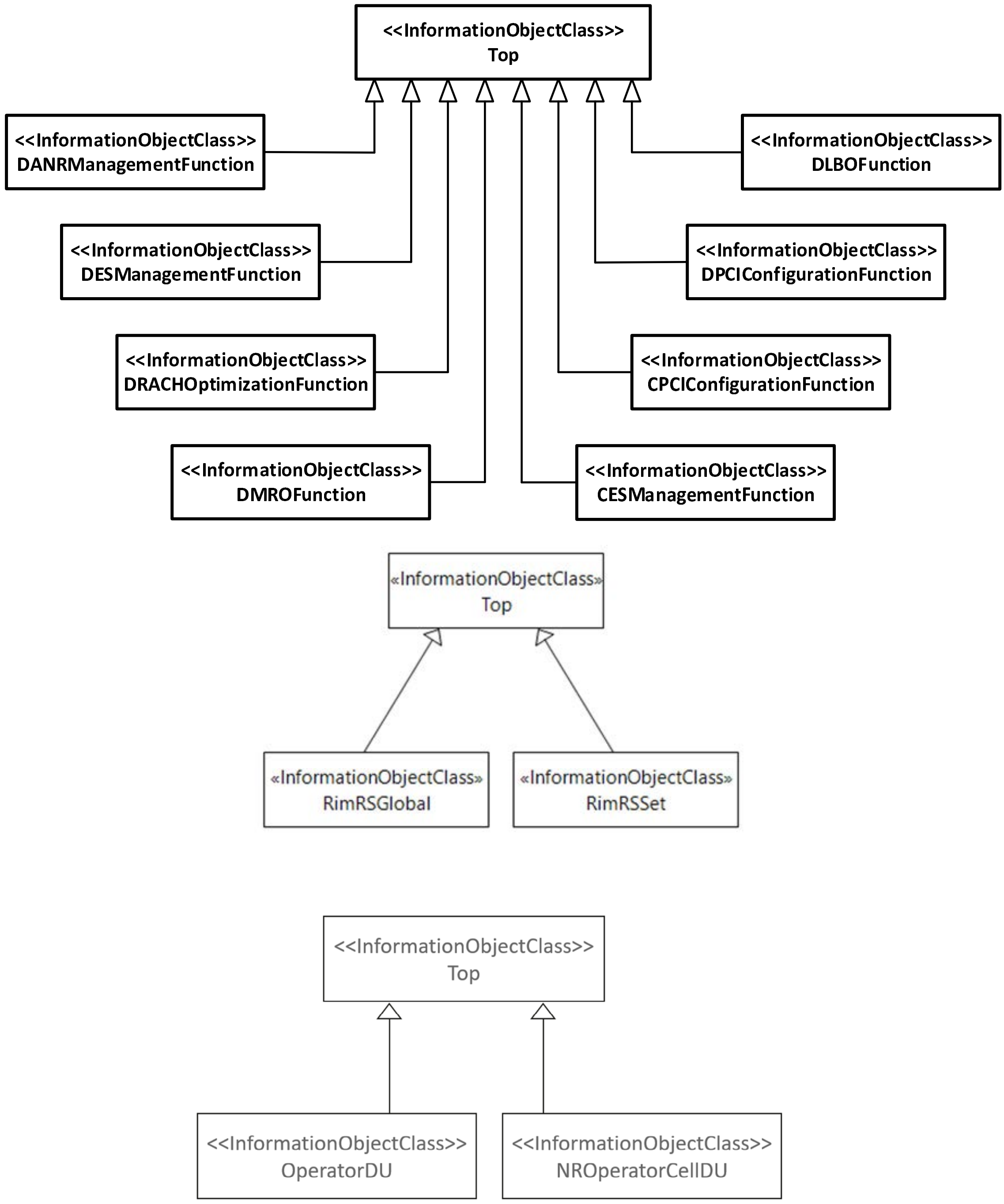


Figure 4.2.1.2-1: Inheritance Hierarchy

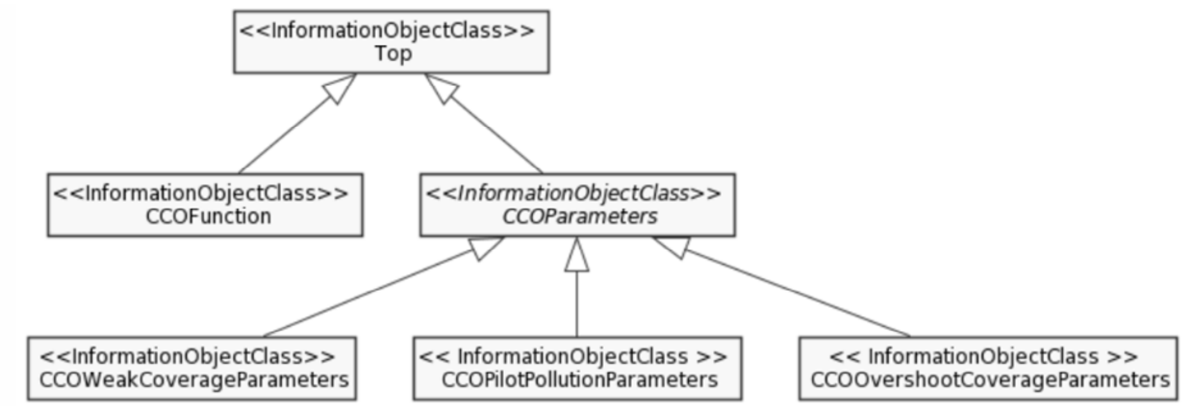


Figure 4.2.1.2-2: Inheritance Hierarchy

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 gNB-DU defined in clause 6.1.1 in 3GPP TS 38.401 [4].

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

Req / Role	End point requirement for 3-split deployment scenario	End point requirement for 2-split deployment scenario	End point requirement for Non-split deployment scenario
gNB	<<IOC>>EP_F1C, <<IOC>>EP_F1U	<<IOC>>EP_F1C, <<IOC>>EP_F1U	None.
en-gNB	<<IOC>>EP_F1C, <<IOC>>EP_F1U	<<IOC>>EP_F1C, <<IOC>>EP_F1U	None.

4.3.1.2 Attributes

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

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

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	S	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
x2ListBlockList	CM	T	T	F	T
x2AllowList	CM	T	T	F	T
xnListBlockList	M	T	T	F	T
xnAllowList	M	T	T	F	T
x2XnHOListBlockList	CM	T	T	F	T
mappingSetIDBackhaulAddressList	CM	T	T	F	T
tceIDMappingInfoList	CM	T	T	F	T
dDAPSHOControl	CM	T	T	F	T
dCHOControl	CM	T	T	F	T
Attribute related to role					
configurable5QISetRef	O	T	T	F	T
dynamic5QISetRef	O	T	F	F	T

4.3.2.3 Attribute constraints

Name	Definition
x2ListBlockList	Condition: Multi-Radio Dual Connectivity with the EPC (see TS 37.340 [9] clause 4.1.2) is supported.
x2AllowList	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.
tceIDMappingInfolist	Condition: MDT Function is supported.
dDAPSHOControl	Condition: DAPS is supported.
dCHOControl	Condition: CHO 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	S	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
dynamic5QISetRef	O	T	F	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	S	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	S	isReadable	isWritable	isInvariant	isNotifyable
cellLocalId	CM	T	T	F	T
operationalState	M	T	F	F	T
administrativeState	M	T	T	F	T
cellState	M	T	F	F	T
pLMNInfoList	CM	T	T	F	T
nPNIdentityList	CM	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
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
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 S	Condition: The cell has an uplink (FDD or TDD)
arfcnSUL S	Condition: The cell has a supplementary uplink
nPNIdentityList S	Condition: The cell is a NPN-only cell (see TS 38.331 [54]).
bSChannelBwUL S	Condition: The cell has an uplink (FDD or TDD)
bSChannelBwSUL S	Condition: The cell has a supplementary uplink
nRFrequencyRef S	Condition: Non-split deployment scenario is supported
ssbFrequency S	Condition: nRFrequencyRef is not used.
ssbSubCarrierSpacing S	Condition: nRFrequencyRef is not used.
victimSetRef S	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 associated to corresponding cell(s). 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	S	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	S	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	S	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	S	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 AMF. 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	S	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 UPF. The interface provides non-guaranteed delivery of user plane PDUs between the gNB and UPF. 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	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T
Attribute related to role					
epTransportRef	O	T	F	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 gNB-DU and gNB-CU or gNB-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	S	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 gNB-DU and gNB-CU or gNB-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	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T
attribute related to role					
epTransportRef	O	T	F	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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

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

Attribute name	S	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
isMLBAllowed	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.
isMLBAllowed	Condition: MLB function is supported in the source cell.

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

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
offsetMO	O	T	T	F	F
blockListEntry	O	T	T	F	F
blockListEntryIdleMode	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

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

Attribute name	S	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).

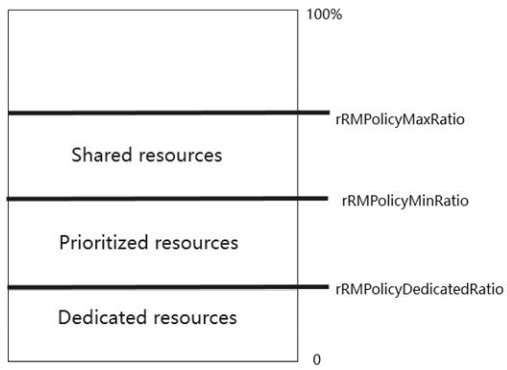


Figure 4.3.36-1 Structure of RRMPolicyRatio

- 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].

NOTE: The resources shown in Figure 4.3.36-1 could be reserved or allocated for user and bearer related requests, e.g. a user connection, a PDU session, etc., if the user is entitled to use the allocated resources according the ratios defined above.

4.3.36.2 Attributes

The `RRMPolicyRatio` IOC includes attributes inherited from *RRMPolicy_* IOC (defined in clause 4.3.43) and the following attributes:

Attribute name	S	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	S	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

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

Attribute name	S	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

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

Attribute name	S	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	S	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

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

Name	Definition
beamAzimuth S	Condition: The beamType is "SSB-BEAM" and Supported by Equipment
beamTilt S	Condition: The beamType is "SSB-BEAM" and Supported by Equipment
beamHorizWidth S	Condition: The beamType is "SSB-BEAM" and Supported by Equipment
beamVertWidth S	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	S	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 S	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	S	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 S	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, PRB in uplink, PRB in downlink,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	S	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	S	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	S	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	S	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

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

Attribute name	S	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	S	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	S	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	S	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	S	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).

NOTE:

RS-1 is equivalent to RIM-RS type 1 (see 38.211 [32], subclause 7.4.1.6).

RS-2 is equivalent to RIM-RS type 2 (see 38.211 [32], subclause 7.4.1.6).

Enough mitigation for RS-1 means "Enough" / "Not enough" indication functionality is enabled for RIM RS-1 and RIM-RS type 1 is used to indicate 'enough mitigation' functionality.

Not enough mitigation for RS-1 means "Enough" / "Not enough" indication functionality is enabled for RIM RS-1 and RIM-RS type 1 is used to indicate 'Not enough mitigation' functionality.

4.3.55.2 Attributes

Attribute name	S	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

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
setId	M	T	T	F	T
setType	M	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	S	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 Energy Saving (ES) functions (see clause 6.2.3.0 in TS 28.310 [71]). This is provided for Energy Saving purposes.

NOTE: in the case where multiple `DESManagementFunction` MOIs exist at different levels of the containment tree, the `DESManagementFunction` MOI at the lower level overrides the `DESManagementFunction` 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	S	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 S	The condition is " the cell acts as an original cell".
intraRatEsActivationCandidateCellsLoadParameters S	The condition is " the cell acts as a candidate cell".
intraRatEsDeactivationCandidateCellsLoadParameters S	The condition is " the cell acts as a candidate cell".
interRatEsActivationOriginalCellParameters CM S	The condition is "The cell acts as an original cell".
interRatEsActivationCandidateCellParameters CM S	The condition is "The cell acts as a candidate cell".
interRatEsDeactivationCandidateCellParameters CM S	The condition is "The cell acts as a candidate cell".

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	S	isReadable	isWritable	isInvariant	isNotifyable
ueAccProbilityDist	M	T	T	F	T
ueAccDelayProbilityDist	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 `DMROFunction` MOIs exist at different levels of the containment tree, the `DMROFunction` MOI at the lower level overrides the `DMROFunction` 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	S	isReadable	isWritable	isInvariant	isNotifyable
dmroControl	M	T	T	F	T
maximumDeviationHoTriggerLow	M	T	T	F	T
maximumDeviationHoTriggerHigh	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 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	S	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 Centralized SON function of PCI configuration (see clause 7.2.1 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	S	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 Centralized SON Energy Saving (ES) functions. (see clause 6.2.2 of TS 28.310 [71]) This is provided for Energy Saving purposes.

NOTE: in the case where multiple CESManagementFunction MOIs exist at different levels of the containment tree, the CESManagementFunction MOI at the lower level overrides the CESManagementFunction 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	S	isReadable	isWritable	isInvariant	isNotifyable
cesSwitch	M	T	T	F	T
energySavingControl	M	T	T	F	T
energySavingState	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

4.3.63.3 Attribute constraints

Name	Definition
intraRatEsActivationOriginalCellLoadParameters S	The condition is "Intra-RAT domain centralized SON energy saving is supported AND the cell acts as an original cell".
intraRatEsActivationCandidateCellsLoadParameters S	The condition is "Intra-RAT domain centralized SON energy saving is supported AND the cell acts as a candidate cell".
intraRatEsDeactivationCandidateCellsLoadParameters S	The condition is "Intra-RAT domain centralized SON energy saving is supported AND the cell acts as a candidate cell".
interRatEsActivationOriginalCellParameters CM S	The condition is "The cell acts as an original cell" AND inter-RAT domain centralized SON energy saving is supported.
interRatEsActivationCandidateCellParameters CM S	The condition is "The cell acts as a candidate cell" AND inter-RAT domain centralized SON energy saving is supported.
interRatEsDeactivationCandidateCellParameters CM S	The condition is "The cell acts as a candidate cell" AND inter-RAT domain centralized SON energy saving is supported.

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	S	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.

4.3.65 TceIDMappingInfo <<dataType>>

4.3.65.1 Definition

This data type represents the properties describing the mapping relationship between TCE ID, PLMN where TCE resides and IP address of TCE.

4.3.65.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
tceIPAddress	M	T	T	F	T
tceID	M	T	T	F	T
pLMNTarget	M	T	T	F	T

4.3.65.3 Attribute constraints

None.

4.3.65.4 Notifications

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

4.3.66 NPNIdentity <<dataType>>

4.3.66.1 Definition

This <<dataType>> represents the NPN supported by the <<IOC>> using this <<dataType>> as one of its attributes in case of the cell is a NPN-only cell.

4.3.66.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
plmnid	M	T	T	F	T
cAGIdList	CM	T	T	F	T
nIDList	CM	T	T	F	T

NOTE: It is an ASN.1 CHOICE for a NPN-only cell to populate cAGIdList or nIDList, see TS 38.331 [54].

4.3.66.3 Attribute constraints

Name	Definition
cAGIdList S	Condition: The cell is a NPN-only cell (see TS 38.331 [54]) in case of PNI-NPN.
nIDList S	Condition: The cell is a NPN-only cell (see TS 38.331 [54]) in case of SNPN.

4.3.66.4 Notifications

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

4.3.67 OperatorDU

4.3.67.1 Definition

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

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

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

Req Role	End point requirement for 3-split deployment scenario	End point requirement for 2-split deployment scenario	End point requirement for Non-split deployment scenario
Shared gNB	`<<IOC>>EP_F1C, <<IOC>>EP_F1U`	`<<IOC>>EP_F1C, <<IOC>>EP_F1U`	`None.`
Shared en-gNB	`<<IOC>>EP_F1C, <<IOC>>EP_F1U`	`<<IOC>>EP_F1C, <<IOC>>EP_F1U`	`None.`

For scenarios with an F1 interface supporting multiple PLMN broadcast, the values of the EP_F1C and EP_F1U attributes contained by different OperatorDU of the same GNBDUFunction should be same.

4.3.67.2 Attributes

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
`gNBId`	M	T	T	F	T
`gNBIdLength`	M	T	T	F	T

4.3.67.3 Attribute Constraints

None

4.3.67.4 Notifications

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

4.3.68 NROperatorCellDU

4.3.68.1 Definition

The NROperatorCellDU <<IOC>> contains attributes to support operator specific cell level information (including cellLocalId, pLMNInfoList, nRTAC) to support NG-RAN Multi-Operator Core Network (NG-RAN MOCN) network sharing with multiple Cell Identity broadcast feature. An instance of NROperatorCellDU <<IOC>> should be created and configured for each POP. When configured the attributes override those in the associated NRCellDU instance.

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

4.3.68.2 Attributes

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
cellLocalId	M	T	T	F	T
administrativeState	M	T	T	F	T
pLMNInfoList	M	T	T	F	T
nRTAC	CM	T	T	F	T
Attribute related to role					
nRCellDURef	M	T	T	F	T

4.3.68.3 Attribute Constraints

None

4.3.68.4 Notifications

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

4.3.69 DLBOFunction

4.3.69.1 Definition

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

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

4.3.69.2 Attributes

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
dlboControl	M	T	T	F	T
maximumDeviationHoTriggerLow	M	T	T	F	T
maximumDeviationHoTriggerHigh	M	T	T	F	T
minimumTimeBetweenHoTriggerChange	M	T	T	F	T

4.3.69.3 Attribute constraints

None.

4.3.69.4 Notifications

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

4.3.70 CCOFunction

4.3.70.1 Definition

This IOC contains attributes to support the C-SON function of Capacity and Coverage optimization (See clause 7.2.3 in TS 28.313 [57]).

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

4.3.70.2 Attributes

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

Attribute Name	S	isReadable	isWritable	isInvariant	isNotifyable
cCOControl	M	T	T	F	T

4.3.70.3 Attribute constraints

None.

4.3.70.4 Notifications

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

4.3.71 CCOWeakCoverageParameters

4.3.71.1 Definition

This IOC represents the properties of CCOWeakCoverageParameters. CCOWeakCoverageParameters is one realization of abstract *CCOParameters IOC.*

4.3.71.2 Attributes

The IOC includes attributes inherited from *CCOParameters* IOC

4.3.71.3 Attribute constraints

None.

4.3.71.4 Notifications

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

4.3.72 CCOPilotPollutionParameters

4.3.72.1 Definition

This IOC represents the properties of CCOPilotPollutionParameters. CCOPilotPollutionParameters is one realization of abstract *CCOParameters IOC.*

4.3.72.2 Attributes

The IOC includes attributes inherited from *CCOParameters* IOC.

4.3.72.3 Attribute constraints

None.

4.3.72.4 Notifications

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

4.3.73 CCOOvershootCoverageParameters

4.3.73.1 Definition

This IOC represents the properties of CCOOvershootCoverageParameters.
CCOOvershootCoverageParameters is one realization of abstract *CCOParameters IOC.*

4.3.73.2 Attributes

The CCOFunction IOC includes attributes inherited from *CCOParameters* IOC .

4.3.73.3 Attribute constraints

None.

4.3.73.4 Notifications

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

4.3.74 *CCOParameters*

4.3.74.1 Definition

This IOC represents the properties of an abstract CCOParameters. The *CCOParameters* IOC needs to be subclassed to be instantiated.

The CCOWeakCoverageParameters IOC, CCOPilotPollutionParameters IOC, CCOOvershootCoverageParameters IOC is the realization of a *CCOParameters* IOC, see the inheritance in Figure 4.2.1.2-x.

4.3.74.2 Attributes

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

Attribute Name	S	isReadable	isWritable	isInvariant	isNotifyable
downlinkTransmitPowerRange	O	T	T	F	T
antennaTiltRange	O	T	T	F	T
antennaAzimuthRange	O	T	T	F	T
digitalTiltRange	O	T	T	F	T
digitalAzimuthRange	O	T	T	F	T
coverageShapeList	O	T	T	F	T

4.3.74.3 Attribute constraints

None.

4.3.74.4 Notifications

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

4.3.75 `ParameterRange <<dataType>>`

4.3.75.1 Definition

This data type represents the adjustment range for parameters.

4.3.75.2 Attributes

The data type includes the following attributes:

Attribute Name	S	isReadable	isWritable	isInvariant	isNotifyable
maxValue	M	T	T	F	T
minValue	M	T	T	F	T

4.3.75.3 Attribute constraints

None.

4.3.75.4 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
NRCellDU.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

cAGIdList	It identifies a CAG list containing up to 12 CAG-identifiers per PLMN Identity, see TS 38.331 [54]. CAG is used for the PNI-NPNs to prevent UE(s), which are not allowed to access the NPN via the associated cell(s), from automatically selecting and accessing the associated CAG cell(s). CAG ID is used to combine with PLMN ID to identify a PNI-NPN. allowedValues: BIT STRING (SIZE (32)).	type: String multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: None isNullable: False
nIDList	It identifies a list of NIDs containing up to 12 NIDs per PLMN Identity, see TS 38.331 [54]. NID is used to combine with PLMN ID to identify an SNPN. allowedValues: BIT STRING (SIZE (44)).	type: String 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: False 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. 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: True 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: True isUnique: True defaultValue: None isNullable: False

`nPNIdentityList`	It defines which NPNs that can be served by the NR cell, and which CAG IDs or NIDs can be supported by the NR cell for corresponding PNI-NPN or SNPN in case of the cell is NPN-only cell. (`nPNIdentity` referring to TS 38.331 [54]) allowedValues: Not applicable.	type: NPNIdentity multiplicity: 1..* isOrdered: True 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: False 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: False isUnique: True defaultValue: None isNullable: False
`resourceType`	The resource type of interest for an RRM Policy. allowedValues: PRB, PRB UL, PRB DL (for NRCellDU, GNBDUFunction) RRC connected users (for NRCellCU, GNBCUCPFunction) DRB (for GNBCUUPFunction) See NOTE 2and NOTE 4	type: ENUM 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: False isUnique: True 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: 1 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: 1 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: 1 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
adjacentNRCellRef	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
nRrFreqRelationRef	This attribute contains the DN of the referenced NRFreqRelation. 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 a list of referenced BWPs. allowedValues: DN of a BWP.	type: DN multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False
sectorEquipmentFunctionRef	This attribute contains the DN of the referenced SectorEquipmentFunction. 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
blockListEntry	It specifies a list of PCI (physical cell identity) that are exclude-listed in EUTRAN measurements as described in 3GPP TS 38.331 [54]. allowedValues: { 0…1007 }	type: Integer multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False
blockListEntryIdleMode	It specifies a list of PCI (physical cell identity) that are exclude-listed 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: Real 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: False isUnique: True 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. See NOTE 10.	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 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 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 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: False isUnique: True 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
dDAPSHOControl	This attribute determines whether the DAPS handover function is enabled or disabled. allowedValues: TRUE, FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
dlboControl	This attribute determines whether the D-LBO 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: False isUnique: True defaultValue: None isNullable: False

ueAccProbilityDist	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 cell 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: False isUnique: True defaultValue: None isNullable: True
ueAccDelayProbilityDist	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 cell, 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: False isUnique: True 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 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: False isUnique: True defaultValue: None isNullable: False
dPciConfigurationControl	This attribute determines whether the Distributed 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 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

maximumDeviationHoTriggerLow	This parameter defines the maximum allowed lower deviation of the Handover Trigger, from the default point of operation (see clause 15.5.2.5 in TS 38.300 [3] and clause 9.2.2.61 in TS 38.423 [58].) allowedValues: -20..20 Unit: 0.5 dB	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
maximumDeviationHoTriggerHigh	This parameter defines the maximum allowed upper deviation of the Handover Trigger, from the default point of operation (see clause 15.5.2.5 in TS 38.300 [3]. and clause 9.2.2.61 in TS 38.423 [58].) 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 clause 15.5.2.5 in TS 38.300 [3]). 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 clause 15.5.2.5 in TS 38.300 [3]. 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. The detailed definition for Configurable5QISet see clause 5.3.75. allowedValues: DN of the Configurable5QISet MOI.	type: DN multiplicity: 0..1 isOrdered: False isUnique: True defaultValue: None isNullable: True
dynamic5QISetRef	This is the DN of Dynamic5QISet. The detailed definition for Dynamic5QISet see clause 5.3.94. allowedValues: DN of the Dynamic5QISet MOI.	type: DN 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 the bandwidth of the RIM-RS in resource blocks (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 attribute 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 ($N_{\mathrm{f}}^{\mathrm{RIM}}$) (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: False isUnique: True defaultValue: None isNullable: False
nrofRIMRSSequenceCandidatesofRS1	It is the number of candidate sequences assigned for RIM RS-1 ($N_{\mathrm{s}}^{\mathrm{RIM,1}}$) (see 38.211 [32], subclause 7.4.1.6). It should be even when enableEnoughNotEnoughIndication for RS-1 is ON allowedValues: 1,2..8 see NOTE 10	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
rimRSScrambleIdListofRS1	It is a 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: False isUnique: True defaultValue: None isNullable: False
nrofRIMRSSequenceCandidatesofRS2	It is the number of candidate sequences assigned for RIM RS-2 ($N_{\mathrm{s}}^{\mathrm{RIM,2}}$) (see 38.211 [32], subclause 7.4.1.6). allowedValues: 1,2..8 See NOTE 10.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
rimRSScrambleIdListofRS2	It is a 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: False isUnique: True 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 enableEnoughNotEnoughIndication is equivalent to EnoughIndication (see 38.211 [32], subclause 7.4.1.6) 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 γ for initialization seed of the pseudo-random sequence $\bar{c}(i)$ (see 38.211 [32], subclause 7.4.1.6.2). 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 δ for initialization seed of the pseudo-random sequence $\bar{c}(i)$ (see 38.211 [32], subclause 7.4.1.6.2). 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. P1 is equivalent to $T_{\mathrm{per},1}^{\mathrm{RIM}}$ (see 38.211 [32], subclause 7.4.1.6). 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 P2 is equivalent to $T_{\mathrm{per},2}^{\mathrm{RIM}}$ (see 38.211 [32], subclause 7.4.1.6) 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 ($N_{\mathrm{setID}}^{\mathrm{RIM},2}$) (see 38.211 [32], subclause 7.4.1.6). allowedValues: 0,1...2^22	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nrofConsecutiveRIMRS1	It is the 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 the 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 ($N_{\text{symb,ref}}^{\text{RIM, 1}}$) 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: False isUnique: True 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 ($N_{\text{symb,ref}}^{\text{RIM, 2}}$) 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: False isUnique: True 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" see NOTE 10.	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" see NOTE 10.	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: False isUnique: True defaultValue: N/A isNullable: False
detectedSetID	This attribute 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 attribute 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 attribute 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}. RS1forEnoughMitigation means RIM-RS type 1 is used to indicate 'enough mitigation' functionality. RS1forNotEnoughMitigation means RIM-RS type 1 is used to indicate 'Not enough mitigation' functionality. allowedValues: RS1, RS2, RS1forEnoughMitigation, RS1forNotEnoughMitigation	type: Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

rimRSMonitoringWindowDuration	This attribute 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 $M * P_{\mathrm{t}}$, 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 $N_T = \begin{cases} \left\lceil \frac{N_{\mathrm{setID}}^{\mathrm{RIM,1}}}{N_{\mathrm{f}}^{\mathrm{RIM}} N_{\mathrm{s}}^{\mathrm{RIM,1}}} \right\rceil & \text{if enableEnoughNotEnoughIndication is "disable"} \\ \left\lceil \frac{2N_{\mathrm{setID}}^{\mathrm{RIM,1}}}{N_{\mathrm{f}}^{\mathrm{RIM}} N_{\mathrm{s}}^{\mathrm{RIM,1}}} \right\rceil & \text{if enableEnoughNotEnoughIndication is "enable"} \end{cases}$ $N_{\mathrm{setID}}^{\mathrm{RIM,1}}$ is the total number of set IDs for RIM RS-1 (configured by totalnrofSetIdofRS1), $N_{\mathrm{f}}^{\mathrm{RIM}}$ is the number of candidate frequency resources in the whole network (configured by nrofGlobalRIMRSFrequencyCandidates), and $N_{\mathrm{s}}^{\mathrm{RIM,1}}$ 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 attribute 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 attribute 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 attribute 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 attribute 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 generated and transmitted by victim to indicate its suffering remote interference, and RIM RS2 is generated and transmitted by aggressor to measure if Remote Interference still exist If the attribute value is "RS1", the RIM-RS Set is victim set. If the attribute value is "RS2", the RIM-RS Set is aggressor set. 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: False 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

x2BlockList	This is a list of GeNBIds. If the target node GeNBId is a member of the source node's NRCellCU.x2BlockList, 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.x2AllowList. In such case, the GeNBId in x2AllowList shall be treated as if it is absent. allowedValues: See NOTE 5.	type: String multiplicity: 0..* isOrdered: False isUnique: True defaultValue: None isNullable: False
xnBlockList	This is a list of GgNBIds. If the target node GgNBId is a member of the source node's NRCellCU.xnBlockList, 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.xnAllowList. In such case, the GgNBId in xnAllowList shall be treated as if it is absent. allowedValues: See NOTE 5.	type: String multiplicity: 0..* isOrdered: False isUnique: True defaultValue: None isNullable: False
x2AllowList	This is a list of GeNBIds. If the target node GeNBId is a member of the source node's NRCellCU.x2AllowList, 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.x2BlockList. 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
xnAllowList	This is a list of GgNBIds. If the target node GgNBId is a member of the source node's NRCellCU.xnAllowList, 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.xnBlockList. 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

xnHOBlockList	This is a list of GgNBIds. For all the entries in NRCellCU.xnHOBlockList, 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
x2HOBlockList	This is a list of GeNBIds. For all the entries in NRCellCU.x2HOBlockList, 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
tceIDMappingInfoList	This attribute includes a list of TCE ID, PLMN where TCE resides and the corresponding TCE IP address. It is used in Logged MDT case to provide the information to the gNodeB or GNBCUCPFunction to get the corresponding TCE IP address when there is an MDT log received from the UE. allowedValues: Not applicable	type: tceIDMappingInfo multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: False
tceIPAddress	This attribute indicates IP address of TCE. (See subclause 4.1.1.9.2 in TS 32.422[68])	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
tceID	This attribute indicates TCE Id. (See subclause 4.1.1.9.2 in TS 32.422[68])	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
pLMNTarget	This attribute indicates PLMN where TCE resides. (See subclauses 4.1.1.9.2 and 4.9.2 in TS 32.422 [68])	Type: PLMNId multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
isMLBAllowed	This indicates if mobility load balancing is allowed or prohibited from source cell to target cell. If TRUE, load balancing is allowed from source cell to target cell. The source cell is identified by the name-containing NRCellCU of the NRCellRelation that contains the isMLBAllowed. The target cell is referenced by the NRCellRelation that contains this isLBAllowed. In case of isHOAllowed is FALSE, mobility load balancing is prohibited by handover from source cell to target cell. If FALSE, load balancing shall be prohibited from source cell to target cell. allowedValues: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
NROperatorCellDU.nRCellDURef	This attribute contains the DN of the referenced NRCellDU. allowedValues: N/A	type: DN multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

downlinkTransmitPowerRange	It indicates adjustment range (including maximum value, minimum value) of downlinkTransmitPower to optimize radio coverage. allowedValues: minValue: [0..100] maxValue: [0..100]	type: ParameterRange multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
antennaTiltRange	It indicates adjustment range (including maximum value, minimum value) of antennaTilt to optimize radio coverage. allowedValues: minValue: [-900..900] in unit 0.1 degree maxValue: [-900..900] in unit 0.1 degree	type: ParameterRange multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
antennaAzimuthRange	It indicates adjustment range (including maximum value, minimum value) of antennaAzimuth to optimize radio coverage. allowedValues: minValue: [-1800..1800] in unit 0.1 degree maxValue: [-1800..1800] in unit 0.1 degree	type: ParameterRange multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
digitalTiltRange	It indicates adjustment range (including maximum value, minimum value) of digitalTilt to optimize radio coverage. allowedValues: minValue: [-900..900] in unit 0.1 degree maxValue: [-900..900] in unit 0.1 degree	type: ParameterRange multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
digitalAzimuthRange	It indicates adjustment range (including maximum value, minimum value) of digitalAzimuth to optimize radio coverage. allowedValues: minValue: [-1800..1800] in unit 0.1 degree maxValue: [-1800..1800] in unit 0.1 degree	type: ParameterRange multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
coverageShapeList	It indicates the coverage shape of specific sites which can be selected to optimize radio coverage. allowedValues: 0 .. 65535	type: Integer multiplicity: 0..* isOrdered: True isUnique: True defaultValue: None isNullable: False
cCOControl	This attribute determines whether the centralized SON CCO Function is enabled or disabled. allowedValues: TRUE,FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
maxValue	It indicates the maximum value of the parameter. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
minValue	It indicates the minimum value of the parameter. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

<table>
<tr><td>NROperatorCellDU.administrativeState</td><td>It indicates the administrative state of the NROperatorCellDU. It describes the permission to use or prohibition against using the cell, imposed through the OAM services.

The value of this attribute is effective only when the value of the attribute NRCellDU.administrativeState = UNLOCKED, if the value of the attribute NRCellDU.administrativeState is LOCKED or SHUTTING DOWN, the value of this attribute shall be treated same as the value of NRCellDU.administrativeState.

allowedValues: LOCKED, SHUTTING DOWN, UNLOCKED.
The meaning of these values is as defined in ITU-T Recommendation X.731 [18].</td><td>type: ENUM
multiplicity: 1
isOrdered: N/A
isUnique: N/A
defaultValue: LOCKED
isNullable: False</td></tr>
<tr><td colspan="3">NOTE 1: Void
NOTE 2: The radio resource can be signaling resources (e.g. RRC connected users) or user plane resources (e.g. PRB, PRB UL, PRB DL, DRB). Different RRM Policy maybe applied for different types of radio resource. E.g. RRMPolicyRatio is used for PRB resource. When the resource type is PRB the policy applies for both uplink and downlink, and 'PRB UL' and 'PRB DL' are not used.
NOTE 3: Void
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.
NOTE 10: RIM RS-1, RIM-RS1，RIM RS1 is equivalent to RIM-RS type 1 (see 38.211 [32], clause 7.4.1.6)
RIM RS-2, RIM-RS2，RIM RS2 is equivalent to RIM-RS type 2 (see 38.211 [32], clause 7.4.1.6).</td></tr>
</table>

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	S	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	S	Notes
notifyMOICreation	O	--
notifyMOIDeletion	O	--
notifyMOIAttributeValueChanges	O	--
notifyMOIChanges	O	--
notifyEvent	O	--

4.5.3 Threshold Crossing 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	S	Notes
notifyThresholdCrossing	M	

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
TS 25.538 [79], IOC, EASFunction	EASFunction
TS 25.538 [79], IOC, EESFunction	EESFunction
TS 25.538 [79], IOC, ECSFunction	ECSFunction
TS 28.538 [79], datatype, ServingLocation	ServingLocation

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.

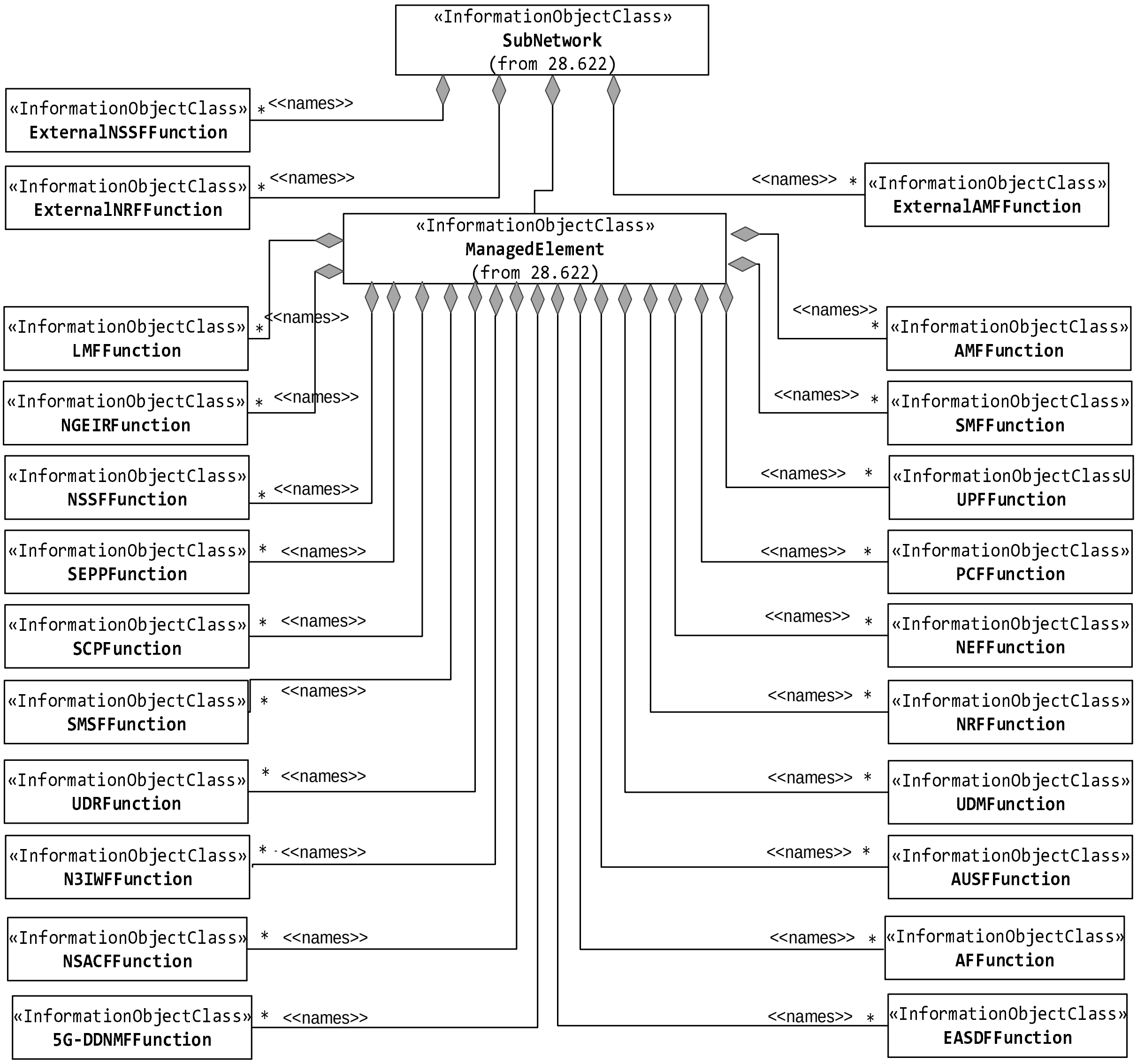


Figure 5.2.1.1-1: 5GC NRM containment/naming relationship

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

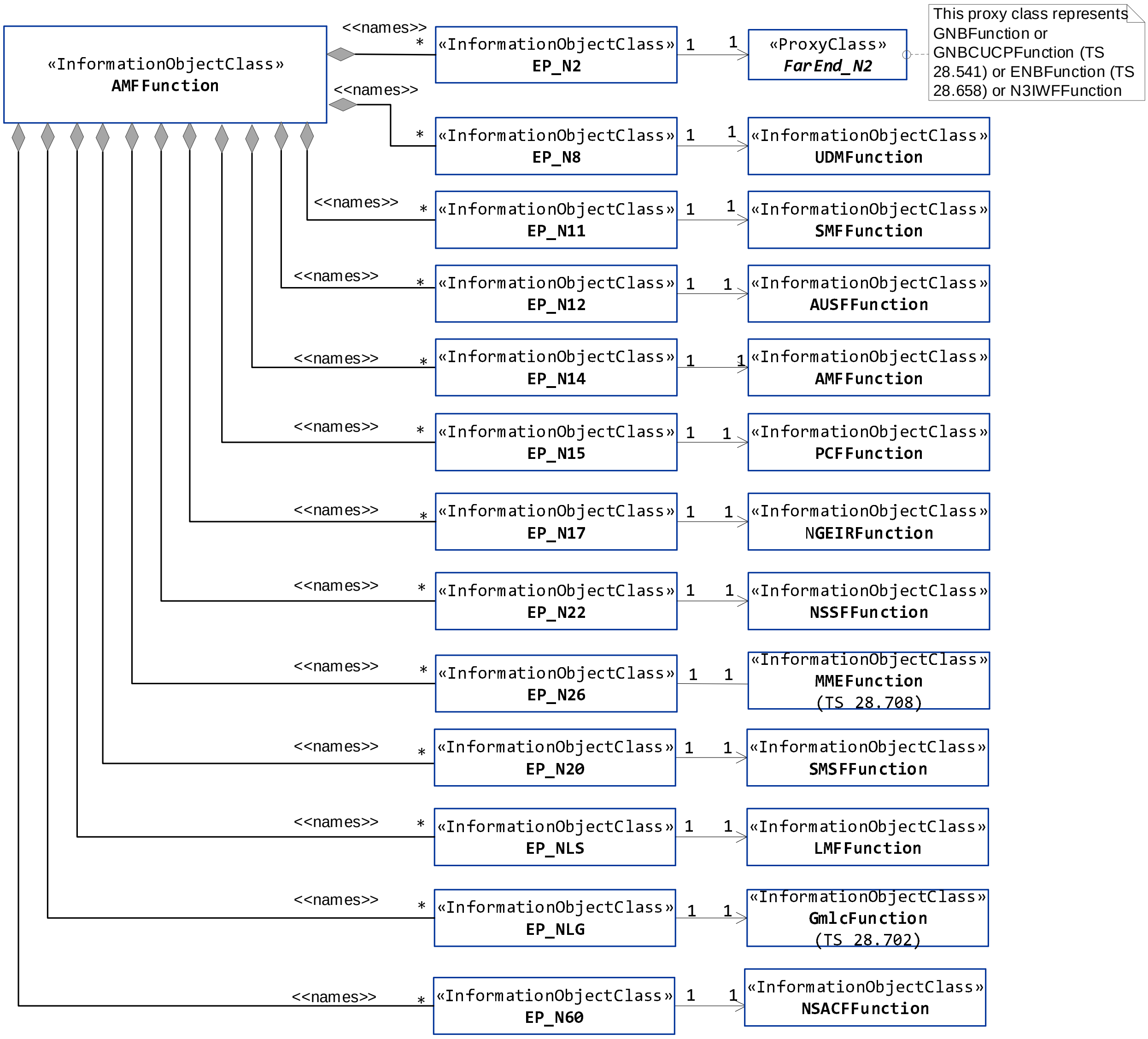


Figure 5.2.1.1-2: Transport view of AMF NRM

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

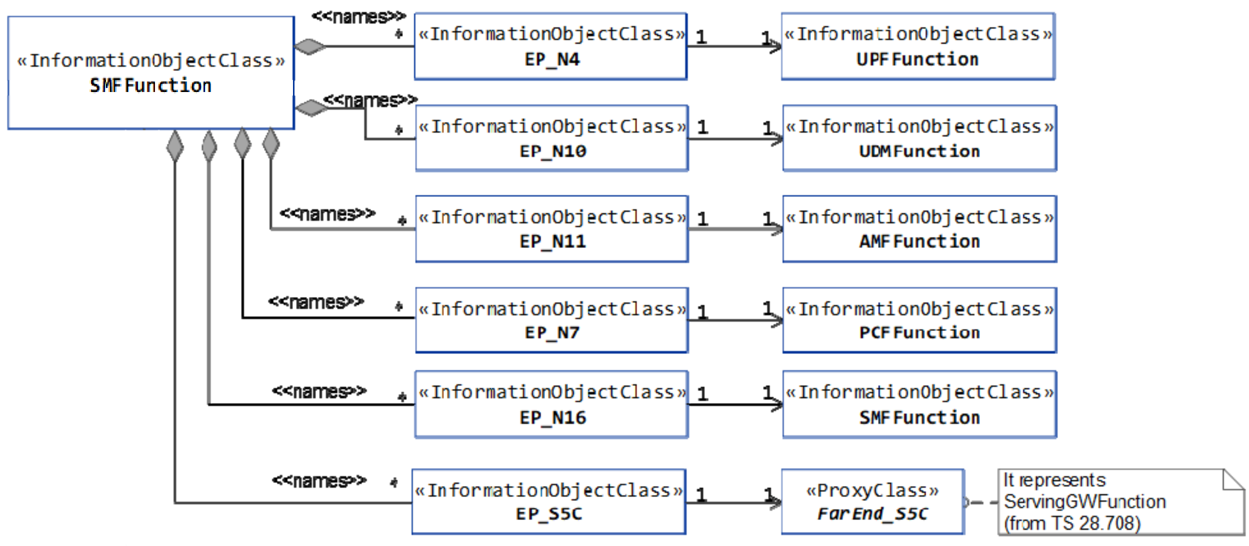


Figure 5.2.1.1-3: Transport view of SMF NRM

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

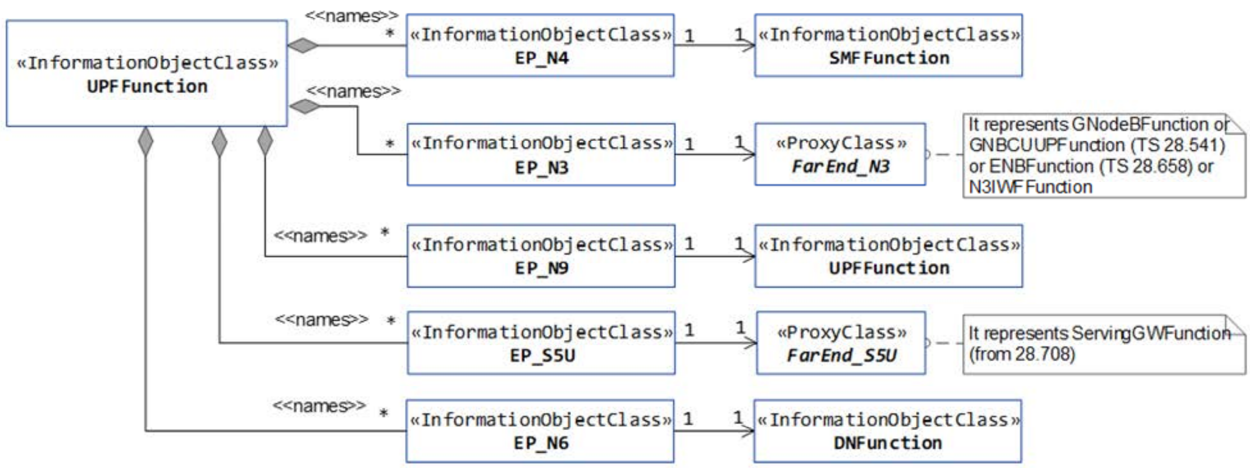


Figure 5.2.1.1-4: Transport view of UPF NRM

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

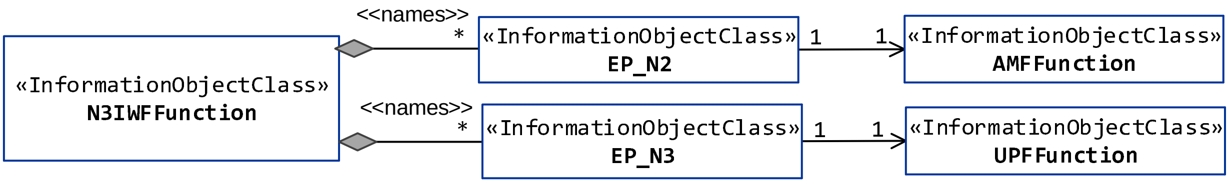


Figure 5.2.1.1-5: Transport view of N3IWF NRM

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

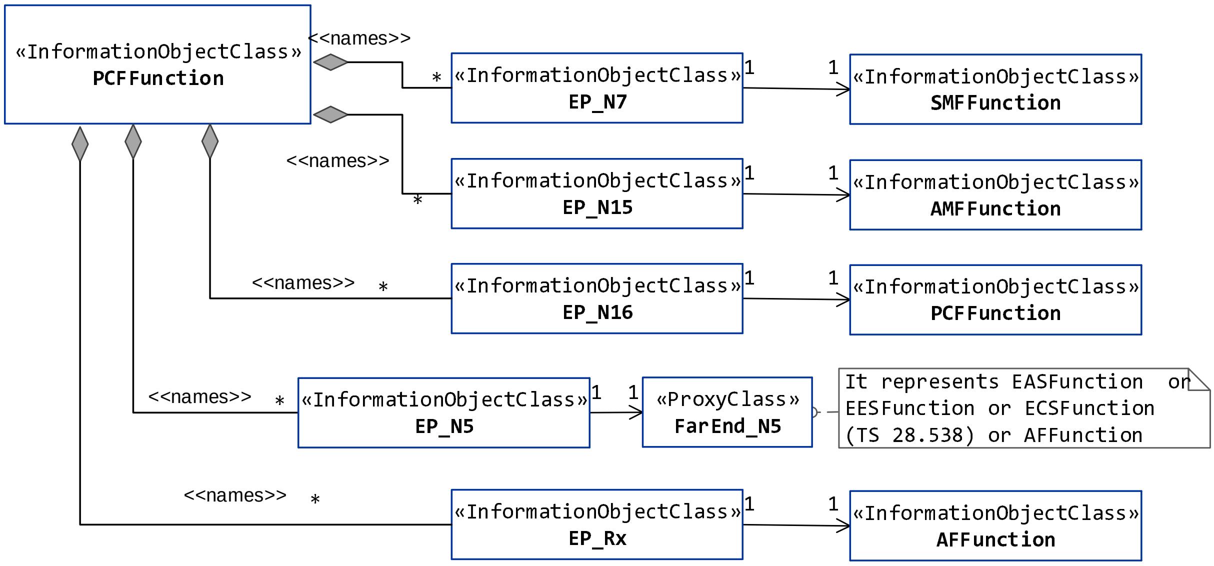


Figure 5.2.1.1-6: Transport view of PCF NRM

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

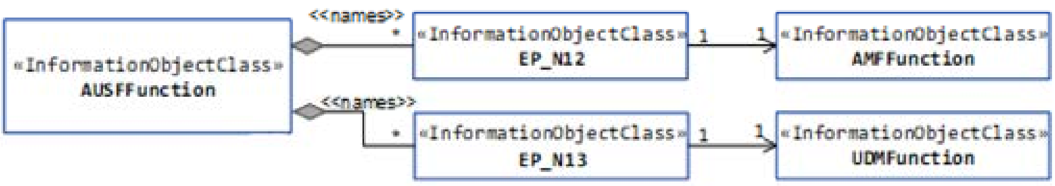


Figure 5.2.1.1-7: Transport view of AUSF NRM

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

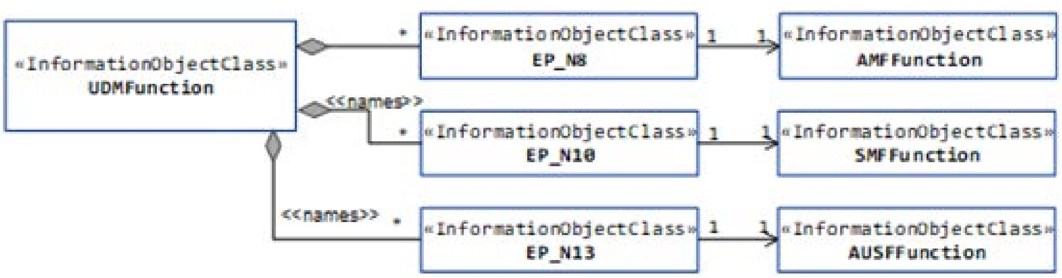


Figure 5.2.1.1-8: Transport view of UDM NRM

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

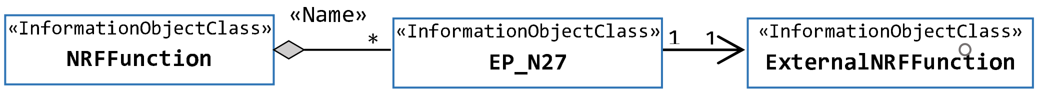


Figure 5.2.1.1-9: Transport view of NRF NRM

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

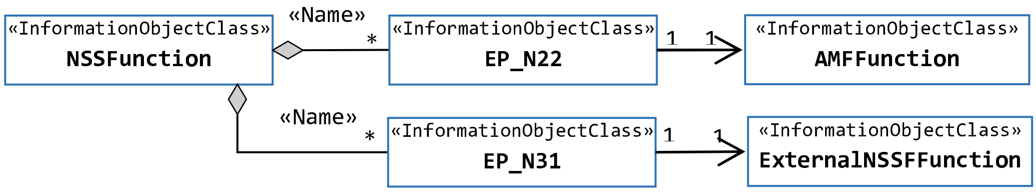


Figure 5.2.1.1-10: Transport view of NSSF NRM

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

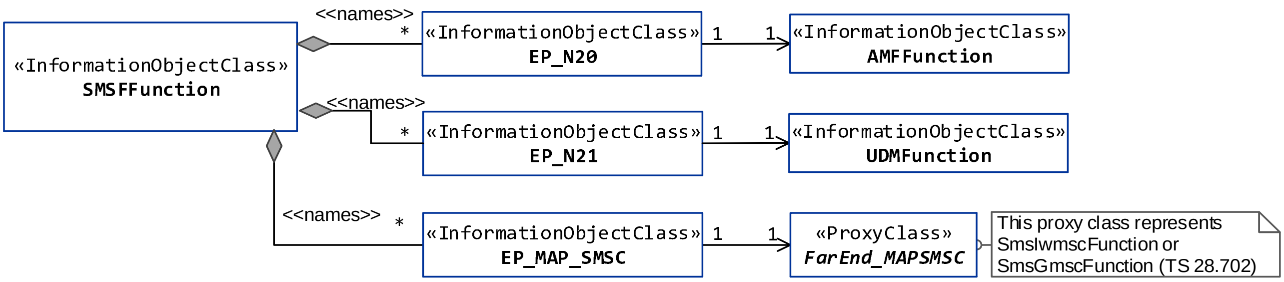


Figure 5.2.1.1-11: Transport view of SMSF NRM

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

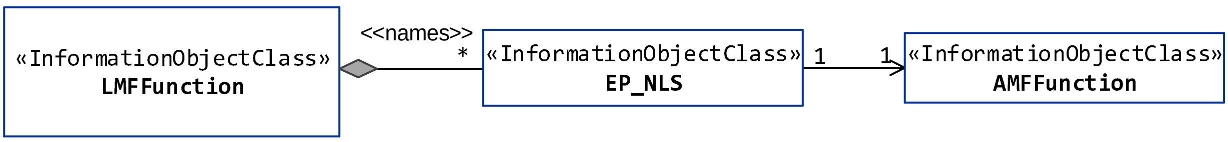


Figure 5.2.1.1-12: Transport view of LMF NRM

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

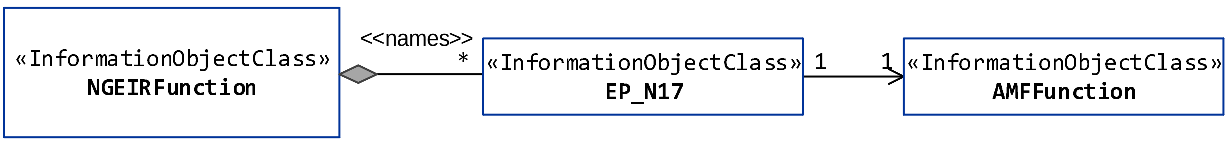


Figure 5.2.1.1-13: Transport view of 5G-EIR NRM

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.

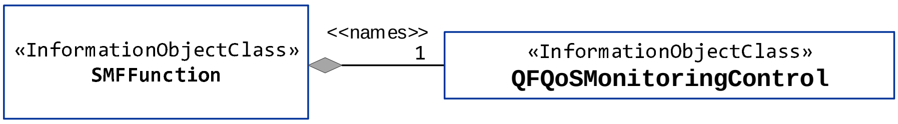


Figure 5.2.1.1-15: NRM fragment for control of QoS monitoring per QoS flow per UE

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

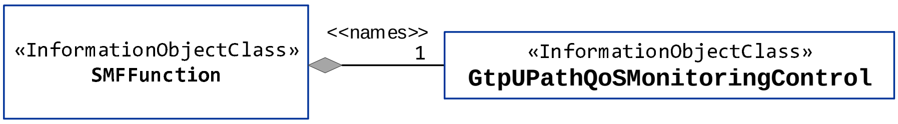


Figure 5.2.1.1-16: NRM fragment for control of GTP-U path QoS monitoring

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

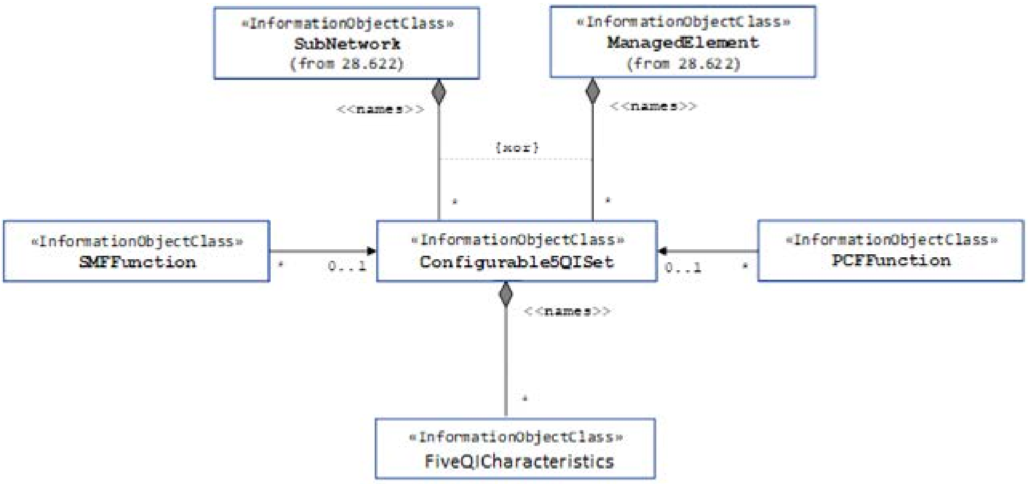


Figure 5.2.1.1-17: NRM fragment for pre-configured 5QIs in 5GC

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

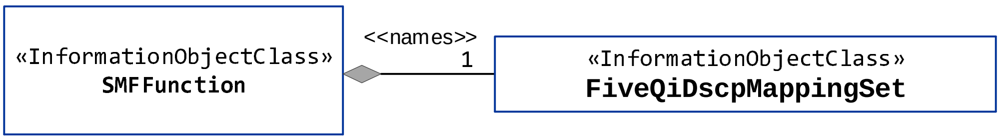


Figure 5.2.1.1-18: NRM fragment for 5QI and DSCP mapping.

The Figure 5.2.1.1-19 shows the NRM fragment for predefined PCC rule.

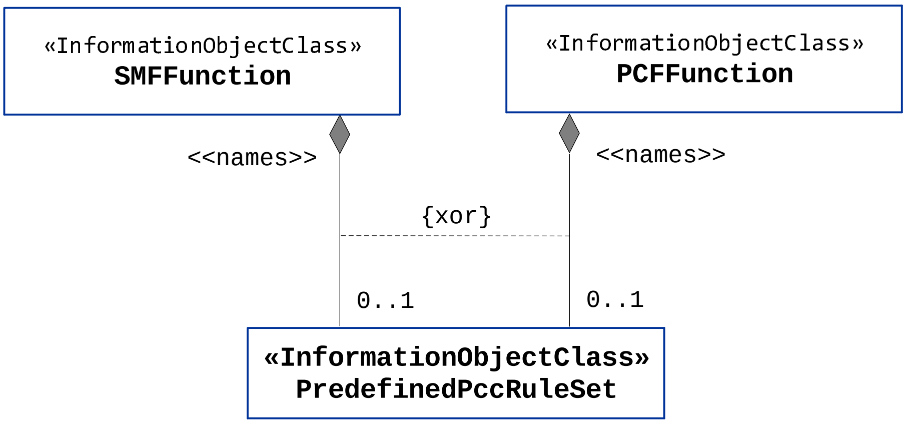


Figure 5.2.1.1-19: NRM fragment for predefined PCC rule

The Figure 5.2.1.1-20 shows the NRM fragment for dynamically assigned 5QIs in 5GC.

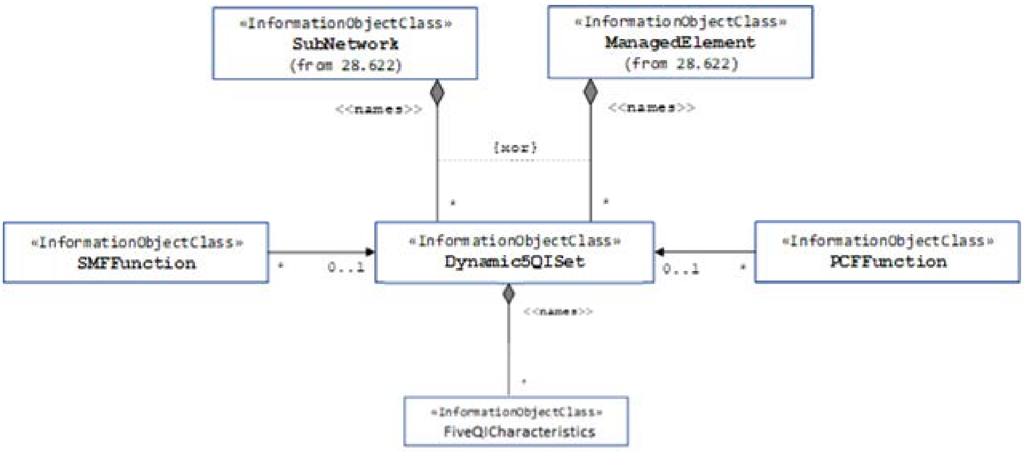


Figure 5.2.1.1-20: NRM fragment for dynamically assigned 5QIs in 5GC

The Figure 5.2.1.1-21 shows the transport view of NSACF NRM.

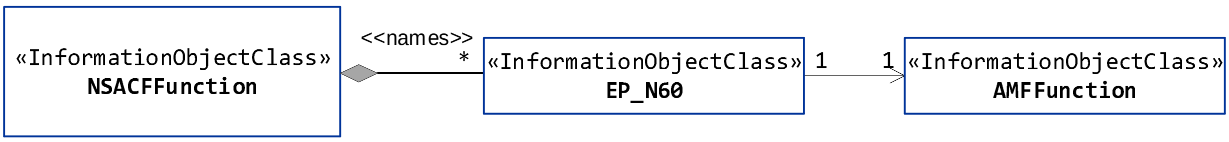


Figure 5.2.1.1-21: Transport view of NSACF NRM

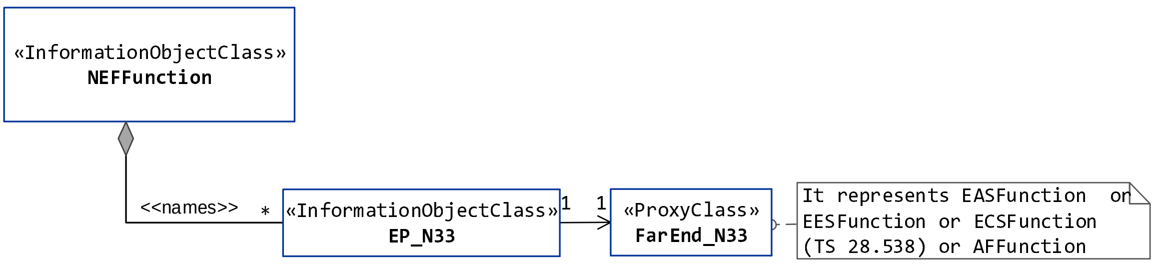


Figure 5.2.1.1-22: Transport view of NEF NRM

The Figure 5.2.1.1-23 shows the transport view of 5G DDNMF NRM.

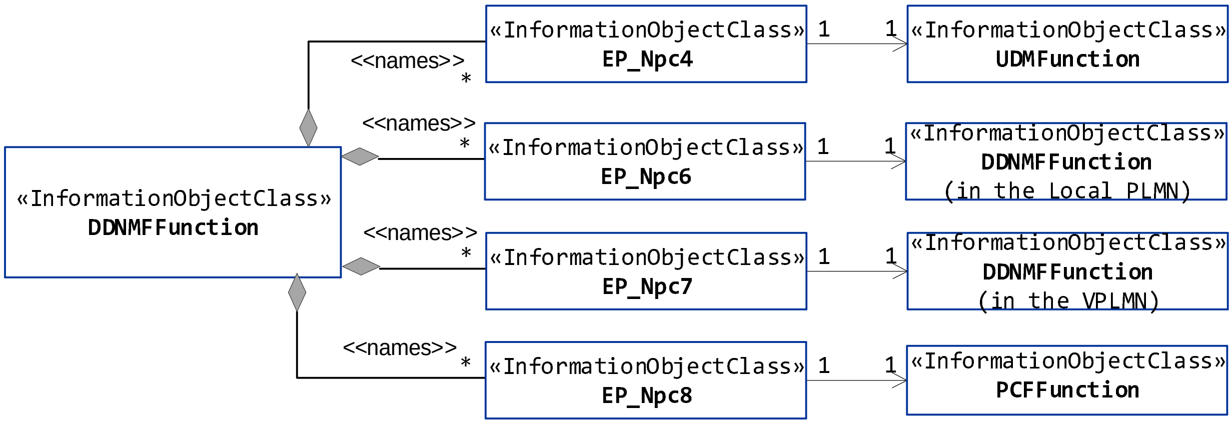


Figure 5.2.1.1-23: Transport view of 5G DDNMF NRM

The Figure 5.2.1.1-24 shows the transport view of 5G EASDF NRM.

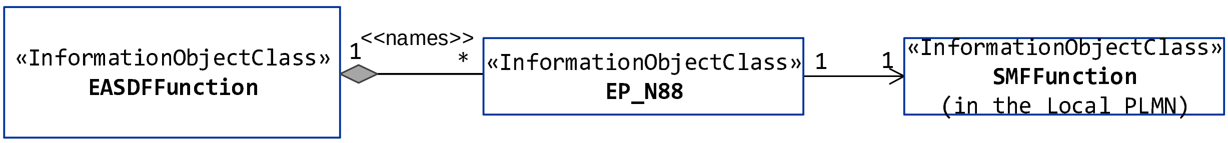


Figure 5.2.1.1-24: Transport view of 5G EASDF NRM

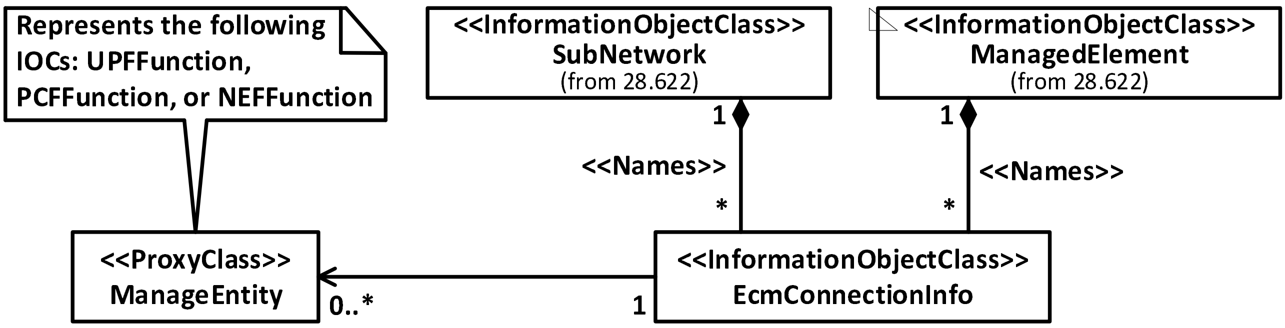


Figure 5.2.1.1-25: EcmConnectionInfo NRM

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.

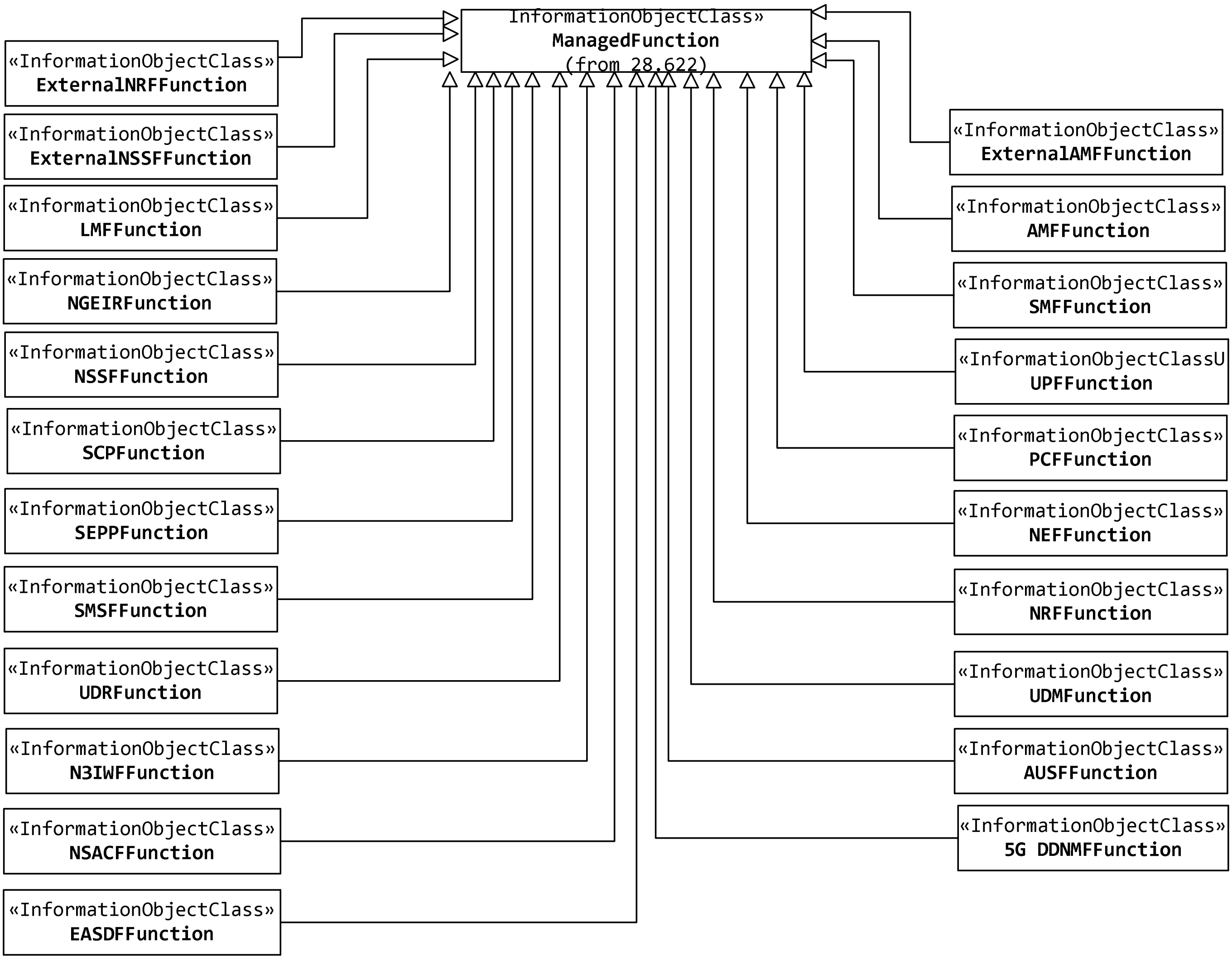


Figure 5.2.1.2-1: Inheritance hierarchy from IOC ManagedFunction related to the 5GC NF NRM

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

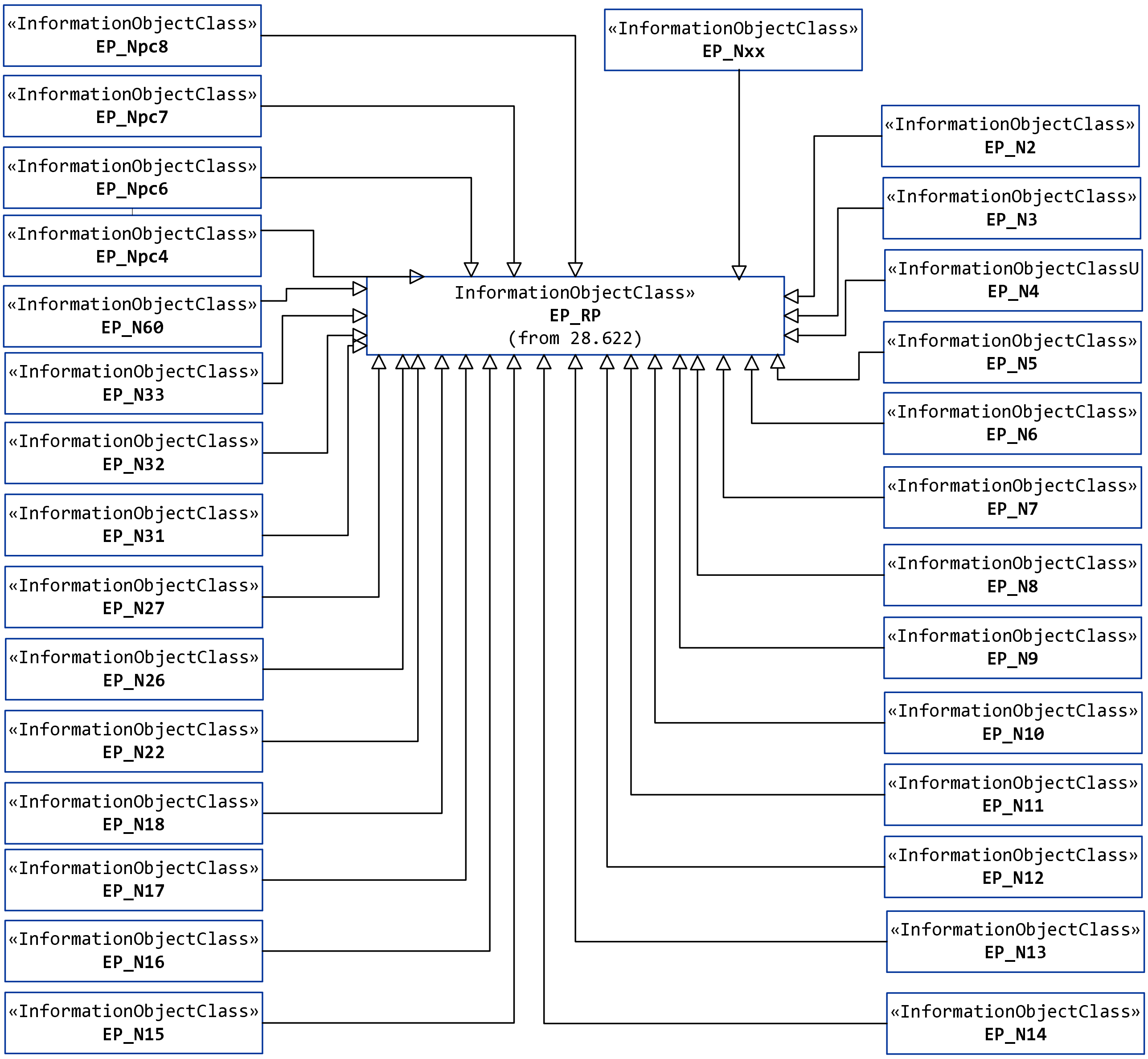


Figure 5.2.1.2-2: Inheritance hierarchy from IOC EP_RP related to the 5GC NF NRM

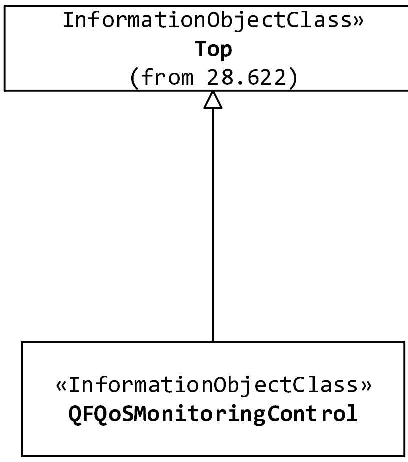


Figure 5.2.1.2-3: Inheritance hierarchy for IOC QFQoSMonitoringControl

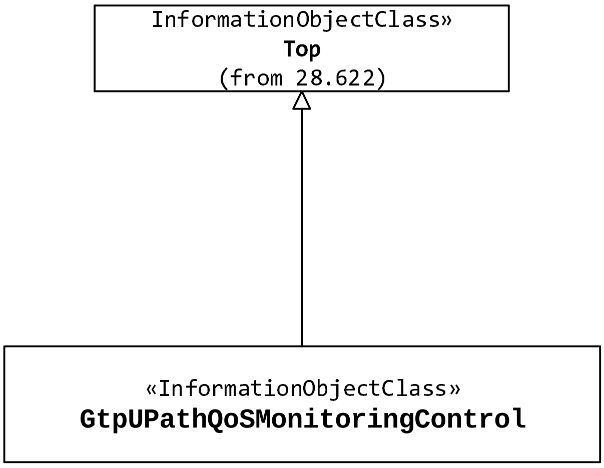


Figure 5.2.1.2-4: Inheritance hierarchy for IOC GtpUPathQoSMonitoringControl

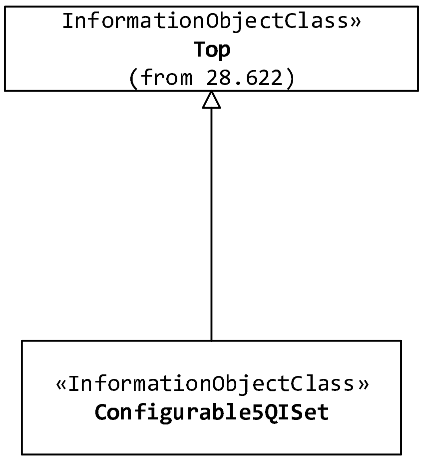


Figure 5.2.1.2-5: Inheritance hierarchy for IOC Configurable5QISet

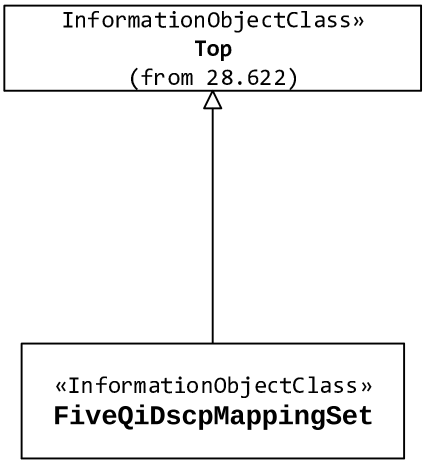


Figure 5.2.1.2-6: Inheritance hierarchy for IOC FiveQiDscpMapping

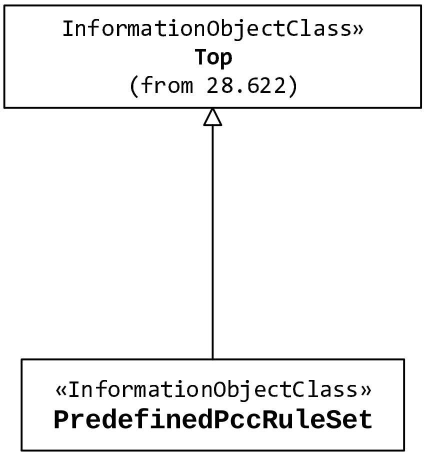


Figure 5.2.1.2-7: Inheritance hierarchy for predefined PCC rule modeling

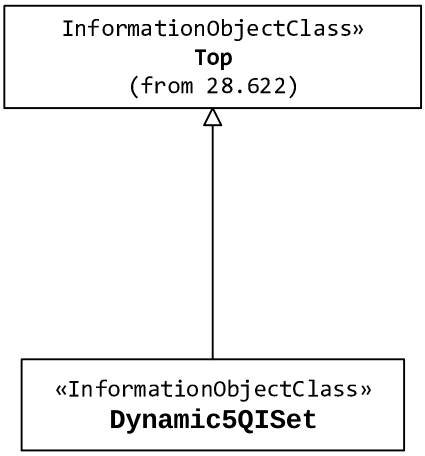


Figure 5.2.1.2-8: Inheritance hierarchy for IOC Dynamic5QISet

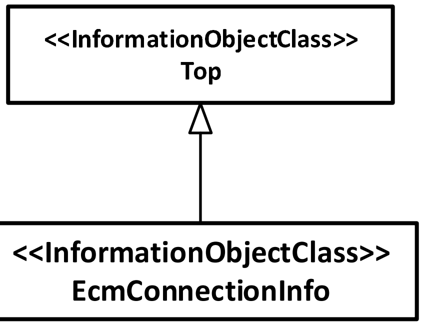


Figure 5.2.1.2-9: Inheritance hierarchy for EcmConnectionInfo

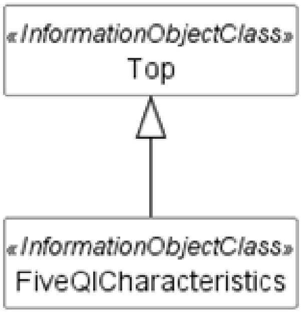


Figure 5.2.1.2-10: FiveQICharacteristics Inheritance

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.

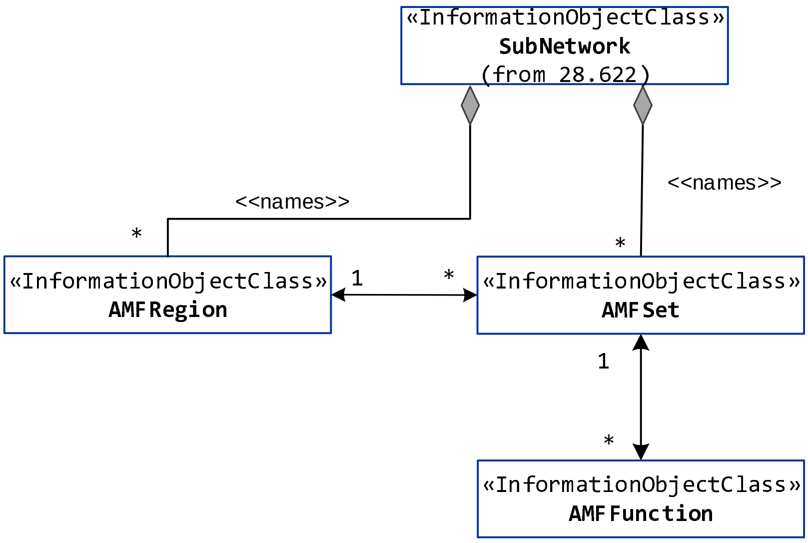


Figure 5.2.2.1-1: AMF Region/AMF Set NRM

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.

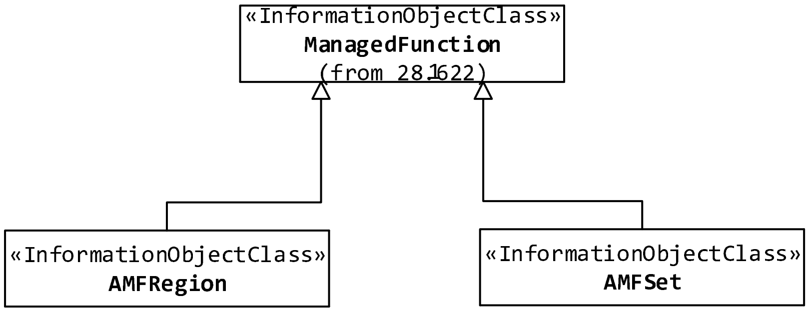


Figure 5.2.2.2-1: AMF Region/AMF Set Inheritance

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	S	isReadable	isWritable	isInvariant	isNotifyable
pLMNInfoList	M	T	T	F	T
aMFIdentifier	M	T	T	F	T
sBIFQDN	M	T	T	F	T
interPlmnFQDN	O	T	T	F	T
taiList	O	T	T	F	T
taiRangeList	O	T	T	F	T
cNSIIdList	CM	T	F	F	T
gUAMIdList	M	T	F	F	T
backupInfoAmfFailure	O	T	T	F	T
backupInfoAmfRemoval	O	T	T	F	T
managedNFProfile	M	T	T	F	T
commModelList	M	T	T	F	T
Attribute related to role					
aMFSetRef	M	T	T	F	T

5.3.1.3 Attribute constraints

Name	Definition
cNSIIdList S	Condition: Network slicing feature is supported and the NSI ID is configured 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.

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	S	isReadable	isWritable	isInvariant	isNotifyable
pLMNInfoList	M	T	T	F	T
nRTAClist	M	T	T	F	T
sBIFQDN	M	T	T	F	T
sNssaiSmfInfoList	M	T	T	F	T
taiList	O	T	T	F	T
taiRangeList	O	T	T	F	T
pgwFqdn	O	T	T	F	T
pgwIpAddrList	O	T	T	F	T
accessType	O	T	T	F	T
priority	O	T	T	F	T
cNSIIdList	CM	T	F	F	T
vsmfSupportInd	O	T	T	F	T
pgwFqdnList	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
dynamic5QISetRef	O	T	F	F	T

5.3.2.3 Attribute constraints

Name	Definition
cNSIIdList S	Condition: Network slicing feature is supported.
pgwFqdnList S	Condition: Present if pgwFqdn attribute is present.

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	S	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 S	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	S	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	S	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
Attribute related to role					
configurable5QISetRef	O	T	T	F	T
dynamic5QISetRef	O	T	F	F	T

5.3.5.3 Attribute constraints

Name	Definition
sNSSAIList S	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	S	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 S	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	S	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
eCSAddrConfigInfo	O	T	T	F	T

5.3.5.3 Attribute constraints

Name	Definition
sNSSAIList S	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	S	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 S	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	S	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 S	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	S	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	CO	T	T	F	T

5.3.10.3 Attribute constraints

Name	Definition
sNSSAIList S	Condition: network slicing feature is supported.
nfProfileList S	Condition: NF profile is registered and deregistered by management system.
cNSIIdList S	Condition: Network slicing feature is supported and the NSI ID is configured 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.

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	S	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	S	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	S	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	S	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 S	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	S	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	S	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
`networkSliceInfoList`	CM	T	T	T	T

5.3.18.3 Attribute constraints

Name	Definition
`sNSSAIList S`	Condition: Network slicing feature is supported.
`networkSliceInfoList S`	Condition: Network slicing feature is supported and the NWDAF is allowedauthorized to collect the management data of the network slices.

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	S	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	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T
Attribute related to role					
epTransportRef	O	T	F	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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	S	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					
aMFRegionRef	M	T	T	F	T
aMFSetMemberList	M	T	T	F	T

5.3.51.3 Attribute constraints

Name	Definition
sNSSAIList S	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	S	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					
aMFSetListRef	M	T	T	F	T

5.3.52.3 Attribute constraints

Name	Definition
sNSSAIList S	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	S	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 [2]).

5.3.54.2 Attributes

Attribute Name	S	isReadable	isWritable	isInvariant	isNotifyable
nfInstanceID	M	T	F	T	F
nfType	M	T	F	F	F
heartBeatTimer	O	T	T	F	T
hostAddr	M	T	T	F	T
authzInfo	O	T	T	F	T
allowedPLMNs	O	T	T	F	T
allowedSNPNs	O	T	T	F	T
allowedNfTypes	O	T	T	F	T
allowedNfDomains	O	T	T	F	T
allowedNSSAIs	O	T	T	F	T
locality	O	T	T	F	T
capacity	O	T	T	F	T
recoveryTime	O	T	F	F	F
nfServicePersistence	O	T	F	F	F
nfSetIdList	O	T	T	F	T
nfProfileChangesSupportInd	O	T	F	F	F
defaultNotificationSubscriptions	O	T	F	F	F
servingScope	O	T	T	F	T
nfSetRecoveryTimeList	O	T	F	F	T
serviceSetRecoveryTimeList	O	T	F	F	F
scpDomains	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.

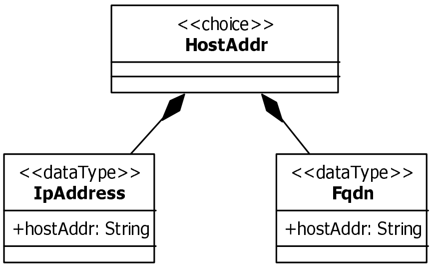


Figure 5.3.55.1-1: HostAddr <<choice>> for data types

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.

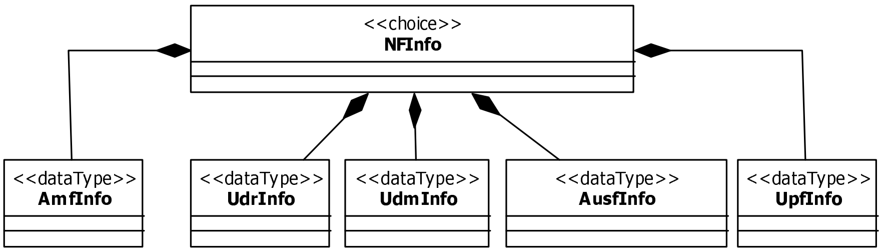


Figure 5.3.56.1-1: NFInfo choice for data types

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	S	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	S	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	S	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 Void

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	S	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	S	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

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

Attribute name	S	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	S	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
isCAPIFSup	M	T	F	T	F
tailList	O	T	F	T	F
taiRangelist	O	T	F	T	F
routeToLocsdnai	O	T	F	T	F

5.3.65.3 Attribute constraints

Name	Definition
sNSSAIList S	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

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

Attribute name	S	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	S	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	S	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

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

Attribute name	S	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 S	Condition: isEventTriggeredQFMonitoringSupported attribute of the same MOI is set to “Yes”.
qFMinimumWaitTime S	Condition: isEventTriggeredQFMonitoringSupported attribute of the same MOI is set to “Yes”.
qFMeasurementPeriod S	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	S	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

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

Attribute name	S	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 S	Condition: isEventTriggeredGtpUPathMonitoringSupported attribute of the same MOI is set to "Yes".
gtpUPathMinimumWaitTime S	Condition: isEventTriggeredGtpUPathMonitoringSupported attribute of the same MOI is set to "Yes".
gtpUPathMeasurementPeriod S	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	S	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 pre-configured 5QIs, including their QoS characteristics, see 3GPP TS 23.501 [2].

5.3.75.2 Attributes

The `Configurable5QISet` IOC includes attributes inherited from Top IOC (defined in TS 28.622[30]) .

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`

5.3.76.1 Definition

This specifies the 5QI value and the corresponding QoS characteristics for a 5QI.

5.3.76.2 Attributes

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
fiveQIValue	M	T	T/F (NOTE)	F	T
resourceType	M	T	T/F (NOTE)	F	T
priorityLevel	O	T	T/F (NOTE)	F	T
packetDelayBudget	O	T	T/F (NOTE)	F	T
packetErrorRate	O	T	T/F (NOTE)	F	T
averagingWindow	O	T	T/F (NOTE)	F	T
maximumDataBurstVolume	O	T	T/F (NOTE)	F	T
NOTE: The isWritable qualifier is "T" if the attribute 1) describes a 5QI in Configurable5QISet MOI, or 2) describes a 5QI in Dynamic5QISet MOI which is associated to PCFFunction MOI or SMFFunction MOI when the PCF is not deployed; The isWritable qualifier is "F" otherwise.					

5.3.76.3 Attribute constraints

None

5.3.76.4 Notifications

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

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	S	isReadable	isWritable	isInvariant	isNotifyable
scalar	M	T	T/F (NOTE)	F	T
exponent	M	T	T/F (NOTE)	F	T
NOTE: The isWritable qualifier is "T" if the attribute 1) describes a 5QI in Configurable5QISet MOI, or 2) describes a 5QI in Dynamic5QISet MOI which is associated to PCFFunction MOI or SMFFunction MOI when the PCF is not deployed; The isWritable qualifier is "F" otherwise.					

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

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

Attribute name	S	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	S	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.

5.3.80 PredefinedPccRuleSet

5.3.80.1 Definition

This IOC specifies the predefined PCC rules, which are configured to SMF and referenced by PCF, see 3GPP TS 23.503 [59].

5.3.80.2 Attributes

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
predefinedPccRules	M	T	T	F	T

5.3.80.3 Attribute constraints

None.

5.3.80.4 Notifications

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

5.3.81 `PccRule` <<dataType>>

5.3.81.1 Definition

This data type specifies the PCC rule, see TS 29.512 [60].

5.3.81.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
`pccRuleId`	M	T	T	F	T
`flowInfoList`	CM	T	T	F	T
`applicationId`	CM	T	T	F	T
`appDescriptor`	O	T	T	F	T
`contentVersion`	O	T	T	F	T
`precedence`	CM	T	T	F	T
`afSigProtocol`	O	T	T	F	T
`isAppRelocatable`	O	T	T	F	T
`isUeAddrPreserved`	O	T	T	F	T
`qosData`	M	T	T	F	T
`altQosParams`	O	T	T	F	T
`trafficControlData`	M	T	T	F	T
`conditionData`	O	T	T	F	T
`tscaiInputUl`	O	T	T	F	T
`tscaiInputDl`	O	T	T	F	T

5.3.81.3 Attribute constraints

Name	Definition
`flowInfoList` S	Condition: The `applicationId` is not supported.
`applicationId` S	Condition: The `flowInfoList` is not supported.
`precedence` S	Condition: The `flowInfoList` is provided.

5.3.81.4 Notifications

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

5.3.82 `FlowInformation` <<dataType>>

5.3.82.1 Definition

This data type specifies the flow information of a PCC rule.

5.3.82.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
`flowDescription`	M	T	T	F	T
`ethFlowDescription`	M	T	T	F	T
`packFiltId`	M	T	T	F	T
`packetFilterUsage`	M	T	T	F	T
`tosTrafficClass`	M	T	T	F	T
`spi`	M	T	T	F	T
`flowLabel`	O	T	T	F	T
`flowDirection`	M	T	T	F	T

5.3.82.3 Attribute constraints

None

5.3.82.4 Notifications

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

5.3.83 `EthFlowDescription` <<dataType>>

5.3.83.1 Definition

This data type describes an Ethernet flow.

5.3.83.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
`destMacAddr`	M	T	T	F	T
`ethType`	M	T	T	F	T
`fDesc`	CM	T	T	F	T
`fDir`	M	T	T	F	T
`sourceMacAddr`	M	T	T	F	T
`vlanTags`	M	T	T	F	T
`srcMacAddrEnd`	O	T	T	F	T
`destMacAddrEnd`	O	T	T	F	T

5.3.83.3 Attribute constraints

Name	Definition
`fDesc` S	Condition: The `ethType` is IP.

5.3.83.4 Notifications

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

5.3.84 QoSData <<dataType>>

5.3.84.1 Definition

This data type specifies the QoS control policy data for a service flow of a PCC rule.

5.3.84.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
qosId	M	T	T	F	T
fiveQIValue	M	T	T	F	T
maxbrUl	O	T	T	F	T
maxbrDl	O	T	T	F	T
gbrUl	O	T	T	F	T
gbrDl	O	T	T	F	T
arp	M	T	T	F	T
qosNotificationControl	O	T	T	F	T
reflectiveQos	O	T	T	F	T
sharingKeyDl	O	T	T	F	T
sharingKeyUl	O	T	T	F	T
maxPacketLossRateDl	O	T	T	F	T
maxPacketLossRateUl	O	T	T	F	T
extMaxDataBurstVol	O	T	T	F	T

5.3.84.3 Attribute constraints

None.

5.3.84.4 Notifications

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

5.3.85 ARP <<dataType>>

5.3.85.1 Definition

This data type specifies the allocation and retention priority of a QoS control policy.

5.3.85.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
priorityLevel	M	T	T	F	T
preemptCap	M	T	T	F	T
preemptVuln	M	T	T	F	T

5.3.85.3 Attribute constraints

None

5.3.85.4 Notifications

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

5.3.86 TrafficControlData <<dataType>>

5.3.86.1 Definition

This data type specifies the traffic control data for a service flow of a PCC rule.

5.3.86.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
tcId	M	T	T	F	T
flowStatus	M	T	T	F	T
redirectInfo	O	T	T	F	T
addRedirectInfo	O	T	T	F	T
muteNotif	O	T	T	F	T
trafficSteeringPolIdDl	O	T	T	F	T
trafficSteeringPolIdUl	O	T	T	F	T
routeToLocs	M	T	T	F	T
traffCorreInd	O	T	T	F	T
upPathChgEvent	O	T	T	F	T
steerFun	O	T	T	F	T
steerModeDl	O	T	T	F	T
steerModeUl	O	T	T	F	T
mulAccCtrl	O	T	T	F	T
sNSSAIList	O	T	T	F	T

5.3.86.3 Attribute constraints

None

5.3.86.4 Notifications

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

5.3.87 RedirectInformation <<dataType>>

5.3.87.1 Definition

This data type specifies the redirect information for traffic control in the PCC rule.

5.3.87.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
redirectEnabled	M	T	T	F	T
redirectAddressType	M	T	T	F	T
redirectServerAddress	M	T	T	F	T

5.3.87.3 Attribute constraints

None

5.3.87.4 Notifications

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

5.3.88 RouteToLocation <<dataType>>

5.3.88.1 Definition

This data type specifies a list of location which the traffic shall be routed to for the AF request.

5.3.88.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
dnai	M	T	T	F	T
routeInfo	CM	T	T	F	T
routeProfId	CM	T	T	F	T

5.3.88.3 Attribute constraints

Name	Definition
routeInfo S	Condition: The routeProfId is not supported.
routeProfId S	Condition: The routeInfo is not supported.

5.3.88.4 Notifications

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

5.3.89 RouteInformation <<dataType>>

5.3.89.1 Definition

This data type specifies the traffic routing information.

5.3.89.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
ipv4Addr	CM	T	T	F	T
ipv6Addr	CM	T	T	F	T
portNumber	M	T	T	F	T

5.3.89.3 Attribute constraints

Name	Definition
`ipv4Addr` S	Condition: The `ipv6Addr` is not supported.
`ipv6Addr` S	Condition: The `ipv4Addr` is not supported.

5.3.89.4 Notifications

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

5.3.90 `UpPathChgEvent` <<dataType>>

5.3.90.1 Definition

This data type specifies the information about the AF subscriptions of the UP path change, see TS 29.512 [60].

5.3.90.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
`notificationUri`	M	T	T	F	T
`notifCorreId`	M	T	T	F	T
`dnaiChgType`	M	T	T	F	T
`afAckInd`	O	T	T	F	T

5.3.90.3 Attribute constraints

None

5.3.90.4 Notifications

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

5.3.91 `SteeringMode` <<dataType>>

5.3.91.1 Definition

This data type specifies the traffic distribution rule, see TS 29.512 [60].

5.3.91.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
`steerModeValue`	M	T	T	F	T
`active`	CM	T	T	F	T
`standby`	O	T	T	F	T
`threeGLoad`	CM	T	T	F	T
`prioAcc`	CM	T	T	F	T

5.3.91.3 Attribute constraints

Name	Definition
`active` S	Condition: The `steerModeValue` supports “ACTIVE_STANDBY”.
`threeGLoad` S	Condition: The `steerModeValue` supports “LOAD_BALANCING”.
`prioAcc` S	Condition: The `steerModeValue` supports “PRIORITY_BASED”.

5.3.91.4 Notifications

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

5.3.92 `ConditionData` <<dataType>>

5.3.92.1 Definition

This data type specifies the condition data for a PCC rule.

5.3.92.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
`condId`	M	T	T	F	T
`activationTime`	O	T	T	F	T
`deactivationTime`	O	T	T	F	T
`accessType`	O	T	T	F	T
`ratType`	O	T	T	F	T

5.3.92.3 Attribute constraints

None

5.3.92.4 Notifications

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

5.3.93 `TscaiInputContainer` <<dataType>>

5.3.93.1 Definition

This data type specifies the transports TSCAI input parameters for TSC traffic at the ingress interface of the DS-TT/UE for a PCC rule, see TS 29.512 [60].

5.3.93.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
`periodicity`	O	T	T	F	T
`burstArrivalTime`	O	T	T	F	T

5.3.93.3 Attribute constraints

None

5.3.93.4 Notifications

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

5.3.94 Dynamic5QISet

5.3.94.1 Definition

This IOC specifies the dynamically assigned 5QIs including their QoS characteristics, see 3GPP TS 23.501 [2]. The instance of this IOC shall not be created or modified by the MnS consumer except for the instance associated to `PCFFunction` MOI or `SMFFunction` MOI when the PCF is not deployed.

5.3.94.2 Attributes

The `Dynamic5QISet` IOC includes attributes inherited from Top IOC (defined in TS 28.622[30]).

5.3.94.3 Attribute constraints

None.

5.3.94.4 Notifications

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

5.3.95 NetworkSliceInfo <<dataType>>

5.3.95.1 Definition

This data type represents information of network slice when the NWDAF is authorized to collect the management data of the network slice.

5.3.95.2 Attributes

Attribute Name	S	isReadable	isWritable	isInvariant	isNotifyable
sNSSAI	M	T	T	F	T
cNSIId	CM	T	T	F	T
networkSliceRef	M	T	T	F	T

5.3.95.3 Attribute constraints

Name	Definition
cNSIId S	Condition: Network slicing feature is supported and the NSI ID is configured 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.

5.3.95.4 Notifications

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

5.3.96 NSACFFunction

5.3.96.1 Definition

This IOC represents the Network Slice Admission Control Function (NSACF) in 5GC. The NSACF monitors and controls the number of registered UEs per network slice for the network slices that are subject to Network Slice Admission Control (NSAC). The NSACF is configured with the maximum number of UEs per network slice and the maximum number of PDU Sessions per network slice which are allowed to be served by each network slice that is subject to NSAC. For more information about the NSACF and admission control procedure, see 3GPP TS 23.501 [2] and 3GPP TS 23.502 [2].

5.3.96.2 Attributes

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
managedNFProfile	M	T	T	F	T
nsacfInfoSnssaiList	M	T	T	F	T

5.3.96.3 Attribute constraints

None

5.3.96.4 Notifications

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

5.3.97 SnssaiInfo <<dataType>>

5.3.97.1 Definition

This data type defines generic information for a S-NSSAI.

5.3.97.2 Attributes

Attribute Name	S	isReadable	isWritable	isInvariant	isNotifyable
pLMNInfo	M	T	T	F	T
administrativeState	M	T	T	F	T

5.3.97.3 Attribute constraints

None

5.3.97.4 Notifications

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

5.3.98 NsacfInfoSnssai <<dataType>>

5.3.98.1 Definition

This data type defines NSACF specific information per S-NSSAI .

5.3.98.2 Attributes

Attribute Name	S	isReadable	isWritable	isInvariant	isNotifyable
snssaiInfo	M	T	T	F	T
isSubjectToNsac	M	T	T	F	T
maxNumberofUEs	M	T	T	F	T
eACMode	CM	T	F	F	T
activeEacThreshhold	CM	T	T	F	T
deactiveEacThreshhold	CM	T	T	F	T
numberofUEs	O	T	F	F	T
uEIdList	O	T	F	F	T
taiListtAI	O	T	T	F	T
maxNumberofPDUSessions	M	T	T	F	T

5.3.98.3 Attribute constraints

Name	Definition
eACMode S	Condition: early access control feature is supported.
activeEacThreshhold S	Condition: early access control feature is supported.
deactiveEacThreshhold S	Condition: early access control feature is supported.

5.3.98.4 Notifications

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

5.3.99 EP_N60

5.3.99.1 Definition

This IOC represents the N60 interface between AMF and ASACF, which is defined in 3GPP TS 23.501 [2].

5.3.99.2 Attributes

The EP_N60 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.99.3 Attribute constraints

None.

5.3.99.4 Notifications

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

5.3.100 EP_N33

5.3.100.1 Definition

This IOC represents the N33 interface between NEF and AF, which is defined in 3GPP TS 23.501 [2].

5.3.100.3 Attributes

The EP_N33 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.100.3 Attribute constraints

None.

5.3.100.4 Notifications

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

5.3.101 DDNMFFunction

5.3.101.1 Definition

This IOC represents the 5G DDNMF which is the logical function handling network related actions required for dynamic 5G ProSe Direct Discovery. For more information about the 5G DDNMF, see 3GPP TS 23.304 [73].

5.3.101.2 Attributes

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
pLMNId	M	T	T	F	T
sBIFQDN	M	T	T	F	T
managedNFProfile	M	T	T	F	T
commModelList	M	T	T	F	T

5.3.101.3 Attribute constraints

None.

5.3.101.4 Notifications

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

5.3.102 EP_Npc4

5.3.102.1 Definition

This IOC represents the Npc4 interface between the UDM and 5G DDNMF, which is defined in 3GPP TS 23.304 [73].

5.3.102.2 Attributes

The EP_Npc4 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.102.3 Attribute constraints

None.

5.3.102.4 Notifications

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

5.3.103 EP_Npc6

5.3.103.1 Definition

This IOC represents the Npc6 interface between the 5G DDNMF in the HPLMN and the 5G DDNMF in a Local PLMN (5G ProSe Direct Discovery), which is defined in TS 23.304 [73].

5.3.103.2 Attributes

The EP_Npc6 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.103.3 Attribute constraints

None.

5.3.103.4 Notifications

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

5.3.104 EP_Npc7

5.3.104.1 Definition

This IOC represents the Npc7 interface between the 5G DDNMF in the HPLMN and the 5G DDNMF in the VPLMN, which is defined in TS 23.304 [73].

5.3.104.2 Attributes

The EP_Npc7 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.104.3 Attribute constraints

None.

5.3.104.4 Notifications

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

5.3.105 GUAMInfo <<dataType>>

5.3.105.1 Definition

This <<dataType>> represents the GUAM identifier, a global unique identifier for the AMF.

5.3.105.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
pLMNId	M	T	T	F	T
aMFIdentifier	M	T	T	F	T

5.3.105.3 Notifications

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

5.3.106 TaiRange <<dataType>>

5.3. 106.1 Definition

This <<dataType>> represents the range of TAIs.

5.3.106.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
pLMNId	M	T	T	F	T
nRTACRangeList	M	T	T	F	T

5.3.106.3 Notifications

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

5.3.107 nRTACRange <<dataType>>

5.3.107.1 Definition

This <<dataType>> represents the range of TACs.

5.3.107.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
nRTACstart	O	T	T	F	T
nRTACend	O	T	T	F	T
nRTACpattern	O	T	T	F	T

Either the start and end attributes, or the pattern attribute, shall be present.

5.3.107.3 Notifications

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

5.3.108 SCPInfo <<dataType>>

5.3.108.1 Definition

This <<dataType>> represents the information of a Service Communication Proxy (SCP) instance as defined in 3GPP TS 29.510 [23].

5.3.108.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
scpDomainInfoList	O	T	T	F	T
scpPrefix	O	T	T	F	T
scpPorts	O	T	T	F	T
addressDomains	O	T	T	F	T
ipv4Addresses	O	T	T	F	T
ipv6Prefixes	O	T	T	F	T
ipv4AddrRanges	O	T	T	F	T
ipv6PrefixRanges	O	T	T	F	T
servedNfSetIdList	O	T	T	F	T
remotePlmnList	O	T	T	F	T
ipReachability	O	T	T	F	T

5.3.108.3 Notifications

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

5.3.109 SCPDomainInfo <<dataType>>

5.3.109.1 Definition

This <<dataType>> represents the SCP domain specific information as defined in 3GPP TS 29.510 [23].

5.3.109.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
scpFQND	O	T	T	F	T
scpEndPoints	O	T	T	F	T
scpPorts	O	T	T	F	T
scpPrefix	O	T	T	F	T

If any of these attributes is present for a given SCP domain, it shall apply instead of the attributes fqdn, Ipv4Addresses and Ipv4Addresses within the NFProfile data type for the corresponding SCP Domain.

If none of these attributes is present for a given SCP domain, the attributes fqdn, Ipv4Addresses, and Ipv4Addresses within the NFProfile data type shall apply for the corresponding SCP Domain.

If scpPorts attribute is present, it has precedence over the scpPorts attribute of ScpInfo.

5.3.109.3 Notifications

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

5.3.110 IpEndPoint <<dataType>>

5.3.110.1 Definition

This <<dataType>> represents the IP end points considering both IPv4 and IPv6 addresses.

5.3.110.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
hostAddr	M	T	T	F	T
transport	O	T	T	F	T
Port	O	T	T	F	T

5.3.110.3 Notifications

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

5.3.111 IPv4AddressRange <<dataType>>

5.3.111.1 Definition

This <<dataType>> represents the range of IPv4 addresses.

5.3.111.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
IPv4AddrRangeStart	M	T	T	F	T
IPv4AddrRangeEnd	M	T	T	F	T

5.3.111.3 Notifications

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

5.3.112 IPv6PrefixRange <<dataType>>

5.3.112.1 Definition

This <<dataType>> represents the range of IPv6 address prefix.

5.3.112.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
IPv6PrefRangeStart	M	T	T	F	T
IPv6PrefRangeEnd	M	T	T	F	T

5.3.112.3 Notifications

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

5.3.113 EASDFFunction

5.3.113.1 Definition

This IOC represents the Edge Application Server Discovery Function (EASDF) in 5GC which can handle the DNS messages according to the instruction from the SMF.

For more information about the 5G EASDF, see 3GPP TS 23.548 [78].

5.3.113.2 Attributes

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
pLMNId	M	T	T	F	T
sBIFQDN	M	T	T	F	T
managedNFProfile	M	T	T	F	T
serverAddr	M	T	T	F	T

5.3.114 EP_N88

5.3.114.1 Definition

This IOC represents the N88 interface between the EASDF and SMF, which is defined in 3GPP TS 23.501 [2].

5.3.114.2 Attributes

The EP_N88 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.114.3 Attribute constraints

None.

5.3.114.4 Notifications

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

5.3.115 SNPNInfo <<dataType>>

5.3.115.1 Definition

This <<dataType>> represents the SNPN identifier and associated S-NSSAI.

5.3.115.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
sNPNId	M	T	T	F	T
sNSSAI	CM	T	T	F	T

5.3.115.3 Attribute constraints

Name	Definition
sNSSAI S	Condition: slicing feature is supported.

5.3.115.4 Notifications

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

5.3.116 SNPNId <<dataType>>

5.3.116.1 Definition

This <<dataType>> represents the information of a SNPN identification.

5.3.116.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
mCC	M	T	T	F	T
mNC	M	T	T	F	T
nId	M	T	T	F	T

5.3.116.3 Notifications

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

5.3.117 EP_Npc8

5.3.117.1 Definition

This IOC represents the Npc8 interface between the PCF and 5G DDNMF, which is defined in 3GPP TS 23.304 [73].

5.3.117.2 Attributes

The EP_Npc8 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5.3.117.3 Attribute constraints

None.

5.3.117.4 Notifications

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

5.3.118 DefaultNotificationSubscription <<dataType>>

5.3.118.1 Definition

This <<dataType>> represents the range of default notification subscriptions as defined in 3GPP TS 29.510 [23].

5.3.118.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
notificationType	M	T	F	F	F
callbackURI	M	T	F	F	F
n1MessageClass	O	T	F	F	F
n2InformationClass	O	T	F	F	F
versions	O	T	F	F	F
binding	O	T	F	F	F

5.3.118.3 Notifications

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

5.3.119 EcmConnectionInfo

5.3.119.1 Definition

This IOC contains attributes to enable ECSP management system to connect EDN NFs (i.e., EAS, ECS, and EES) to 5GC NFs (i.e., UPF, PCF, NEF, SCEF) (See clause 6.3.2, 6.3.4, 6.4.6 in TS 28.538 [79]).

5.3.119.2 Attributes

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
eASServiceArea	CM	T	T	F	T
eESServiceArea	CM	T	T	F	T
eDNServiceArea	CM	T	T	F	T
eASIpAddress	CM	T	T	F	T
eESIpAddress	CM	T	T	F	T
eCSIpAddress	CM	T	T	F	T
ednIdentifier	M	T	T	F	T
ecmConnectionType	CM	T	T	F	T
5GCNfConnEcmInfoList	CM	T	T	F	T
uPFConnectionInfo	CM	T	T	F	T

5.3.119.3 Attribute constraints

Name	Definition
eASServiceArea S	Condition: EAS connection to 5GC NF is supported
eASIpAddress S	Condition: EAS connection to 5GC NF is supported
eESServiceArea S	Condition: EES connection to 5GC NF is supported
eESIpAddress S	Condition: EES connection to 5GC NF is supported
eDNServiceArea S	Condition: EAS or ECS connection to 5GC NF is supported
eCSIpAddress S	Condition: ECS connection to 5GC NF is supported
ecmConnectionType S	Condition: EAS connection to 5GC NF is supported
5GCNfConnEcmInfoList S	Condition: EAS, EES, and ECS connections to 5GC NF is supported
uPFConnectionInfo S	Condition: EAS connection to UPF is supported

5.3.119.4 Notifications

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

5.3.120 5GCNfConnEcmInfo <<dataType>>

5.3.120.1 Definition

This data type specifies the 5GC NF connection information.

5.3.120.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
5GCNFType	M	T	T	F	T
5GCNFIpAddress	M	T	T	F	T
5GCNFRef	M	T	T	F	T

Editor's note: Role based attribute of 5GCNfRef inside the dataType needs further work.

5.3.120.3 Attribute constraints

None

5.3.120.4 Notifications

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

5.3.121 UPFConnInfo <<dataType>>

5.3.121.1 Definition

This data type specifies the UPF connection information.

5.3.121.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
uPFIpAddress	M	T	T	F	T
uPFRef	M	T	T	F	T

5.3.121.3 Attribute constraints

None

5.3.121.4 Notifications

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

5.3.122 SnssaiSmfInfoItem <<dataType>>

5.3.122.1 Definition

This <<dataType>> represents the set of parameters supported by SMF for a given S-NSSAI.

5.3.122.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
sNSSAI	M	T	T	F	T
dnnSmfInfoList	M	T	T	F	T

5.3.122.3 Notifications

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

5.3.123 DnnSmfInfoItem <<dataType>>

5.3.123.1 Definition

This <<dataType>> represents the set of parameters supported by SMF for a given DNN.

5.3.123.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
dnn	M	T	T	F	T
dnaiList	O	T	T	F	T

5.3.123.3 Notifications

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

5.3.124 IpAddr <<dataType>>

5.3.124.1 Definition

This <<dataType>> represents the IP address that can be expressed using IPv4 address or IPv6 address or the IPv6 address prefix. This <<dataType>> shall include one of the aforementioned IP address expressions.

5.3.124.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
ipv4Addr	O	T	T	F	T
ipv6Addr	O	T	T	F	T
ipv6Prefix	O	T	T	F	T

5.3.124.3 Notifications

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: * isOrdered: False 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
gUAMIdList	List of supported Globally Unique AMF Ids (GUAMIs).	type: GUAMInfo multiplicity: 1.. * isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
backupInfoAmfFailure	List of GUAMIs for which the AMF acts as a backup for AMF failure.	type: GUAMInfo multiplicity: 1.. * isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
backupInfoAmfRemoval	List of GUAMIs for which the AMF acts as a backup for planned AMF removal.	type: GUAMInfo multiplicity: 1.. * isOrdered: False isUnique: True 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: False isUnique: True 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 NSI ID definition in 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: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
sNSSAIList	See subclause 4.4.1.	
pLMNInfoList	It defines the PLMN(s) of a Network Function.	type: PLMNInfo multiplicity: 1.. * isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
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
interPlmnFQDN	If the NF needs to be discoverable by other NFs in a different PLMN, then an FQDN that is used for inter-PLMN routing as specified in 3GPP TS 23.003 [13] shall be registered with the NRF.	type: String multiplicity: 0..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: False isUnique: True 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: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
taiList	The list of TAIs.	type: TAI multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
taiRangeList	The range of TAIs.	type: TAIRange multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False

sNssaiSmfInfoList	List of parameters supported by the SMF per S-NSSAI	type: SnssaiSmfInfoItem multiplicity: 0..1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
dnnSmfInfoList	List of parameters supported by the SMF per DNN	type: DnnSmfInfoItem multiplicity: 1..N isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
dnn	String representing a Data Network as defined in clause 9A of 3GPP TS 23.003 [13]; it shall contain either a DNN Network Identifier, or a full DNN with both the Network Identifier and Operator Identifier, as specified in 3GPP TS 23.003 [13] clause 9.1.1 and 9.1.2. It shall be coded as string in which the labels are separated by dots (e.g. "Label1.Label2.Label3"). Whether the dnn data type contains just the DNN Network Identifier, or the Network Identifier plus the Operator Identifier, shall be documented in each API where this data type is used.	type: string multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
dnaiList	List of Data network access identifiers supported by the EASDF for this DNN. The absence of this attribute indicates that the EASDF can be selected for this DNN for any DNAI.	type: dnai multiplicity: 1..N isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
dnai	DNAI (Data network access identifier), see clause 5.6.7 of 3GPP TS 23.501 [2].	type: string multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
pgwFqdn	The FQDN of the PGW if the SMF is a combined SMF/PGW-C.	type: string multiplicity: 0..1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
pgwIpAddrList	The PGW IP addresses of the combined SMF/PGW-C. It allows the NF Service consumer to find the target combined SMF/PGW-C by PGW IP Address, e.g., when only PGW IP Address is available.	type: IpAddr multiplicity: 0..1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
vsmfSupportInd	Used by an SMF to explicitly indicate the support of V-SMF capability and its preference to be selected as V-SMF. When present it indicate whether the V-SMF capability is supported by the SMF: - true: V-SMF capability supported by the SMF - false: V-SMF capability not supported by the SMF. When absence the V-SMF capability support of the SMF is not specified.	type: boolean multiplicity: 0..1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False

pgwFqdnList	When present, this attribute provides additional FQDNs to the FQDN indicated in the pgwFqdn attribute. The pgwFqdnList attribute may be present if the pgwFqdn attribute is present.	type: string multiplicity: 0..N isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
nRTACRangeList	The range of TACs.	type: nrTACRange multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
nRTACstart	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). 3-octet string identifying a tracking area code, each character in the string shall take a value of "0" to "9" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the TAC shall appear first in the string, and the character representing the 4 least significant bit of the TAC shall appear last in the string. Pattern: "^([A-Fa-f0-9]{4}|[A-Fa-f0-9]{6})$"	type: String multiplicity: 0..1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
nRTACend	Last value identifying the end of a TAC range, to be used when the range of TAC's can be represented as a hexadecimal range (e.g. TAC ranges). 3-octet string identifying a tracking area code, each character in the string shall take a value of "0" to "9" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the TAC shall appear first in the string, and the character representing the 4 least significant bit of the TAC shall appear last in the string. Pattern: "^([A-Fa-f0-9]{4}|[A-Fa-f0-9]{6})$"	type: String multiplicity: 0..1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
nRTACpattern	Pattern (regular expression according to the ECMA-262 dialect [x0]) representing the set of TAC's belonging to this range. A TAC value is considered part of the range if and only if the TAC string fully matches the regular expression.	type: String multiplicity: 0..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: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
managedNFProfile	This parameter defines profile for managed NF (See TS 23.501 [2]). 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[2] for NF types	type: ENUM multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: False

heartBeatTimer	Time between two consecutive heart-beat messages from an NF Instance to the NRF defined in seconds.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: 0 isNullable: False
fqdn	This parameter defines FQDN of the Network Function (See TS 23.003 [13]) 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[2]). allowedValues: N/A	type: String multiplicity: 1 isOrdered: F isUnique: N/A defaultValue: None isNullable: True
allowedPLMNs	PLMNs allowed to access the NF instance. If not provided, any PLMN is allowed to access the NF.	type: PLMNId multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: True
allowedSNPNs	SNPNs allowed to access the NF instance. The absence of this attribute in the NF profile indicates that no SNPN, other than the SNPN(s) registered in the snpnList attribute of the NF Profile, is allowed to access the service instance.	type: SNPNInfo multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: True
mCC	This is the Mobile Country Code (MCC) of the PLMN identifier. See TS 23.003 [3] subclause 2.2 and 12.1. allowedValues: a bounded string of 3 characters representing 3 digits.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
mNC	This is the Mobile Network Code (MNC) of the PLMN identifier. See TS 23.003 [3] subclause 2.2 and 12.1. allowedValues: A bounded string of 2 or 3 characters representing 2 or 3 digits.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nId	Network Identity; Shall be present if PlmnIdNid identifies an SNPN (see clauses 5.30.2.3, 5.30.2.9, 6.3.4, and 6.3.8 in 3GPP TS 23.501 [2]).	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
allowedNfTypes	Type of the NFs allowed to access the NF instance. If not provided, any NF type is allowed to access the NF. allowedValues: See TS 23.501[2] for NF types	type: ENUM multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: True

allowedNfDomains	Pattern (regular expression according to the ECMA-262 dialect [72]) representing the NF domain names within the PLMN of the NRF allowed to access the NF instance. If not provided, any NF domain is allowed to access the NF.	type: String multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: True
allowedNSSAIs	S-NSSAI of the allowed slices to access the NF instance. If not provided, any slice is allowed to access the NF.	type: S-NSSAI multiplicity: 1..* isOrdered: False isUnique: True 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
recoveryTime	Timestamp when the NF was (re)started. The NRF shall notify NFs subscribed to receiving notifications of changes of the NF profile, if the NF recoveryTime is changed.	type: DateTime multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: True
nfServicePersistence	This parameter indicates whether the different service instances of a same NF Service in the 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 TS 29.510 [23]).	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: True
nfSetIdList	A NF Set Identifier is a globally unique identifier of a set of equivalent and interchangeable CP NFs from a given network that provide distribution, redundancy and scalability (see clause 5.21.3 of 3GPP TS 23.501 [2]). An NF Set Identifier shall be constructed from the MCC, MNC, NID (for SNPN), NF type and a Set ID. A NF Set Identifier shall be formatted as the following string: set<Set ID>.<nftype>set.5gc.mnc<MNC>.mcc<MCC> for a NF Set in a PLMN, or set<Set ID>.<nftype>set.5gc.nid<NID>.mnc<MNC>.mcc<MCC> for a NF Set in a SNPN. At most one NF Set ID shall be indicated per PLMN-ID or SNPN of the NF.	type: String multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
nfProfileChangesSupportInd	This parameter indicates if the NF Service Consumer supports or does not support receiving NF Profile Changes. It may be present in the NFRegister or NFUpdate (NF Profile Complete Replacement) request and shall be absent in the response (see Annex B 3GPP TS 29.510 [23]).	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: True

`defaultNotificationSubscriptions`	Notification endpoints for different notification types. This attribute may contain multiple default subscriptions for a same notification type; in that case, those default subscriptions are used as alternative notification endpoints.	type: DefaultNotificationSubscription multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
`notificationType`	This parameter indicates the types of notifications used in Default Notification URIs in the NF Profile of an NF Instance. allowedValues: "N1_MESSAGES", "N2_INFORMATION", "LOCATION_NOTIFICATION", "DATA_REMOVAL_NOTIFICATION", "DATA_CHANGE_NOTIFICATION", "LOCATION_UPDATE_NOTIFICATION", "NSSAA_REAUTH_NOTIFICATION", "NSSAA_REVOC_NOTIFICATION"	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
`callbackURI`	This attribute contains a default notification endpoint to be used by a NF Service Producer towards an NF Service Consumer that has not registered explicitly a callback URI in the NF Service Producer (e.g. as a result of an implicit subscription).	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
`n1MessageClass`	This attribute (if it is present) identifies that class of N1 messages shall be notified as per TS 29.518 [80].	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: True
`n2InformationClass`	This attribute (if it is present) identifies that class of N2 messages shall be notified as per TS 29.518 [80].	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: True
`versions`	This attribute identifies the API versions (e.g. "v1") supported for the default notification type.	type: String multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
`binding`	This attribute shall contain the value of the Binding Indication for the default subscription notification (i.e. the value part of "3gpp-Sbi-Binding" header), as specified in clause 6.12.4 of 3GPP TS 29.500 [76].	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
`servingScope`	This parameter indicates the served geographical areas of a NF instance.	type: String multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False

nfSetRecoveryTimeList	This parameter contains the recovery time of NF Set(s) indicated by the NfSetId, where the NF instance belongs.	type: DateTime multiplicity: 1.. * isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
serviceSetRecoveryTimeList	This parameter contains the recovery time of NF Service Set(s) configured in the NF instance, which are indicated by the NfServiceSetId.	type: DateTime multiplicity: 1.. * isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
scpDomains	This parameter shall carry the list of SCP domains the SCP belongs to, or the SCP domain the NF (other than SCP) or the SEPP belongs to.	type: String multiplicity: 1.. * isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
vendorId	Vendor ID of the NF instance, according to the IANA-assigned "SMI Network Management Private Enterprise Codes" [77]. allowedValues: 6 decimal digits; if the SMI code has less than 6 digits, it shall be padded with leading digits "0" to complete a 6-digit string value.	type: String multiplicity: 0..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: N/A 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: False 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: False isUnique: True 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: False isUnique: True 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 [13]).	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: False isUnique: False defaultValue: None 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 [13]). 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: False isUnique: True defaultValue: None isNullable: False
fiveQIValues	It indicates a list of 5QI value. allowedValues: 0 - 255	type: Integer multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False
dscp	It indicates a DSCP. allowedValues: 0 – 255	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
configurable5QISetRef	This is the DN of Configurable5QISet. allowedValues: DN of the Configurable5QISet MOI.	type: DN multiplicity: 0..1 isOrdered: False isUnique: True defaultValue: None isNullable: True
dynamic5QISetRef	This is the DN of Dynamic5QISet MOI. allowedValues: DN of the Dynamic5QISet MOI.	type: DN multiplicity: 0..1 isOrdered: False isUnique: True defaultValue: None isNullable: True
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: False isUnique: True 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: False isUnique: True 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: False isUnique: True 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: False isUnique: True 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
predefinedPccRules	It specifies the predefined PCC Rules, see TS 25.503 [59]. allowedValues: N/A	type: PccRule multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: False
pccRuleId	It identifies the PCC rule. allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
flowInfoList	It is a list of IP flow packet filter information. allowedValues: N/A	type: FlowInformation multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False
applicationId	A reference to the application detection filter configured at the UPF. allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
appDescriptor	It is the ATSSS rule application descriptor. allowedValues: see TS 29.571 [61].	type: BitString multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
contentVersion	Indicates the content version of the PCC rule. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
precedence	It indicates the order in which this PCC rule is applied relative to other PCC rules within the same PDU session. allowedValues: 0..255.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

afSigProtocol	Indicates the protocol used for signalling between the UE and the AF. The default value is "NO_INFORMATION". allowedValues: “NO_INFORMATION”, “SIP”.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: “NO_INFORMATION” isNullable: False
isAppRelocatable	It indicates the application relocation possibility. The default value is "FALSE. allowedValues: “TRUE”, “FALSE”.	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
isUeAddrPreserved	It Indicates whether UE IP address should be preserved. The default value is "FALSE". allowedValues: “TRUE”, “FALSE”.	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: “FALSE” isNullable: False
qosData	It contains the QoS control policy data for a PCC rule. allowedValues: N/A	type: QoSData multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False
altQosParams	It contains the QoS control policy data for the Alternative QoS parameter sets of the service data flow. Only the "qosId" attribute, "5qi" attribute, "maxbrUl" attribute, "maxbrDl" attribute, "gbrUl" attribute and "gbrDl" attribute are applicable within the QosData data type. This data type represents an ordered list, where the lower the index of the array for a given entry, the higher the priority. allowedValues: N/A	type: QoSData multiplicity: * isOrdered: True isUnique: True defaultValue: None isNullable: False
trafficControlData	It contains the traffic control policy data for a PCC rule. allowedValues: N/A	type: TrafficControlData multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False
conditionData	It contains the condition data for a PCC rule. allowedValues: N/A	type: ConditionData multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
tscaiInputUl	It contains transports TSCAI input parameters for TSC traffic at the ingress interface of the DS-TT/UE (uplink flow direction). allowedValues: N/A	type: TscaiInputContainer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
tscaiInputDl	It contains transports TSCAI input parameters for TSC traffic at the ingress of the NW-TT (downlink flow direction). allowedValues: N/A	type: TscaiInputContainer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

`flowDescription`	It defines a packet filter for an IP flow. allowedValues: see TS 29.214 [62].	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
`ethFlowDescription`	It defines a packet filter for an Ethernet flow. allowedValues: see TS 29.514 [62].	type: EthFlowDescription multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
`destMacAddr`	It specifies the destination MAC address formatted in the hexadecimal notation according to clause 1.1 and clause 2.1 of IETF RFC 7042 [63]. Pattern: '^([0-9a-fA-F]{2})((-[0-9a-fA-F]{2}){5})$'. allowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
`ethType`	A two-octet string that represents the Ethertype, as described in IEEE 802.3 [64] and IETF RFC 7042 [63] in hexadecimal representation. Each character in the string shall take a value of "0" to "9" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the ethType shall appear first in the string, and the character representing the 4 least significant bits of the ethType shall appear last in the string. allowedValues: see IEEE 802.3 [64] and IETF RFC 7042 [63].	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
`fDesc`	It contains the flow description for the Uplink or Downlink IP flow. It shall be present when the ethtype is IP. allowedValues: see flowDescription in TS 29.214 [62].	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
`fDir`	It indicates the packet filter direction. allowedValues: "DOWNLINK", "UPLINK".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
`sourceMacAddr`	It specifies the source MAC address formatted in the hexadecimal notation according to clause 1.1 and clause 2.1 of IETF RFC 7042 [63]. Pattern: '^([0-9a-fA-F]{2})((-[0-9a-fA-F]{2}){5})$'. allowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

vlanTags	It specifies the Customer-VLAN and/or Service-VLAN tags containing the VID, PCP/DEI fields as defined in IEEE 802.1Q [65] and IETF RFC 7042 [63]. The first/lower instance in the array stands for the Customer-VLAN tag and the second/higher instance in the array stands for the Service-VLAN tag. Each field is encoded as a two-octet string in hexadecimal representation. Each character in the string shall take a value of "0" to "9" or "A" to "F" and shall represent 4 bits. The most significant character representing the PCP/DEI field shall appear first in the string, followed by character representing the 4 most significant bits of the VID field, and the character representing the 4 least significant bits of the VID field shall appear last in the string. If only Service-VLAN tag is provided, empty string for Customer-VLAN tag shall be provided. allowedValues: see IEEE 802.1Q [65] and IETF RFC 7042 [63].	type: String multiplicity: * isOrdered: True isUnique: True defaultValue: None isNullable: False
srcMacAddrEnd	It specifies the source MAC address end. If this attribute is present, the sourceMacAddr attribute specifies the source MAC address start. E.g. srcMacAddrEnd with value 00-10-A4-23-3E-FE and sourceMacAddr with value 00-10-A4-23-3E-02 means all MAC addresses from 00-10-A4-23-3E-02 up to and including 00-10-A4-23-3E-FE. allowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
destMacAddrEnd	It specifies the destination MAC address end. If this attribute is present, the destMacAddr attribute specifies the destination MAC address start. allowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
packFiltId	It is the identifier of the packet filter. allowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
packetFilterUsage	It indicates if the packet shall be sent to the UE. The default value is "FALSE". allowedValues: TRUE, FALSE	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: "FALSE" isNullable: False
tosTrafficClass	It contains the Ipv4 Type-of-Service and mask field or the Ipv6 Traffic-Class field and mask field. allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
spi	It is the security parameter index of the IPSec packet, see IETF RFC 4301 [66]. allowedValues: see IETF RFC 4301 [66].	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
flowLabel	It specifies the Ipv6 flow label header field. AllowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True

flowDirection	It indicates the direction/directions that a filter is applicable. AllowedValues: “DOWNLINK”, “UPLINK”, “BIDIRECTIONAL”, “UNSPECIFIED”.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
qosId	It identifies the QoS control policy data for a PCC rule. AllowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
maxbrUl	It represents the maximum uplink bandwidth formatted as follows: Pattern: '^\d+(\.\d+)? (bps|Kbps|Mbps|Gbps|Tbps)$', see TS 29.512 [60]. Examples: "125 Mbps", "0.125 Gbps", "125000 Kbps" AllowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
maxbrDl	It represents the maximum downlink bandwidth formatted as follows: Pattern: '^\d+(\.\d+)? (bps|Kbps|Mbps|Gbps|Tbps)$', see TS 29.512 [60]. Examples: "125 Mbps", "0.125 Gbps", "125000 Kbps". AllowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
gbrUl	It represents the guaranteed uplink bandwidth formatted as follows: Pattern: '^\d+(\.\d+)? (bps|Kbps|Mbps|Gbps|Tbps)$', see TS 29.512 [60]. Examples: "125 Mbps", "0.125 Gbps", "125000 Kbps". AllowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
gbrDl	It represents the guaranteed downlink bandwidth formatted as follows: Pattern: '^\d+(\.\d+)? (bps|Kbps|Mbps|Gbps|Tbps)$', see TS 29.512 [60]. Examples: "125 Mbps", "0.125 Gbps", "125000 Kbps". AllowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
extMaxDataBurstVol	It denotes the largest amount of data that is required to be transferred within a period of 5G-AN PDB, see TS 29.512 [60]. AllowedValues: 4096..2000000.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
arp	It indicates the allocation and retention priority. AllowedValues: N/A.	type: ARP multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

ARP.priorityLevel	It defines the relative importance of a resource request. AllowedValues: 1..15.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
preemptCap	It defines whether a service data flow may get resources that were already assigned to another service data flow with a lower priority level. AllowedValues: "NOT_PREEMPT", "MAY_PREEMPT".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
preemptVuln	It defines whether a service data flow may lose the resources assigned to it in order to admit a service data flow with higher priority level. AllowedValues: "NOT_PREEMPTABLE", "PREEMPTABLE".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
qosNotificationControl	It indicates whether notifications are requested from 3GPP NG-RAN when the GFBR can no longer (or again) be guaranteed for a QoS Flow during the lifetime of the QoS Flow. The default value is "FALSE". AllowedValues: "TRUE", "FALSE".	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: “FALSE” isNullable: False
reflectiveQos	Indicates whether the QoS information is reflective for the corresponding non-GBR service data flow. The default value is "FALSE". AllowedValues: "TRUE", "FALSE".	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: “FALSE” isNullable: False
sharingKeyDl	It indicates, by containing the same value, what PCC rules may share resource in downlink direction. AllowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
sharingKeyUl	It indicates, by containing the same value, what PCC rules may share resource in uplink direction. AllowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
maxPacketLossRateDl	It indicates the downlink maximum rate for lost packets that can be tolerated for the service data flow. AllowedValues: 0..1000.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
maxPacketLossRateUl	It indicates the uplink maximum rate for lost packets that can be tolerated for the service data flow. AllowedValues: 0..1000.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tcId	It univocally identifies the traffic control policy data within a PDU session. AllowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

flowStatus	It represents whether the service data flow(s) are enabled or disabled. The default value is "ENABLED". See TS 29.514 [67]. AllowedValues: “ENABLED-UPLINK”, “ENABLED-DOWNLINK”, “ENABLED”, “DISABLED”, “REMOVED”.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: “ENABLED” isNullable: False
redirectInfo	It indicates whether the detected application traffic should be redirected to another controlled address. AllowedValues: N/A.	type: RedirectInformation multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: “ENABLED” isNullable: False
addRedirectInfo	It contains the additional redirect information indicating whether the detected application traffic should be redirected to another controlled address. AllowedValues: N/A.	type: RedirectInformation multiplicity: 1..* isOrdered: False isUnique: True defaultValue: “ENABLED” isNullable: False
redirectEnabled	It indicates whether the redirect instruction is enabled. AllowedValues: "TRUE", "FALSE".	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
redirectAddressType	It indicates the type of redirect address, see TS 29.512 [60]. AllowedValues: " IPV4_ADDR", "IPV6_ADDR", “URL”, “SIP_URI”.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
redirectServerAddress	It indicates the address of the redirect server. AllowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
muteNotif	It indicates whether applicat'on's start or stop notification is to be muted. The default value is "FALSE". AllowedValues: "TRUE", "FALSE".	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: “FALSE” isNullable: False
trafficSteeringPolIdDl	It references to a pre-configured traffic steering policy for downlink traffic at the SMF, see TS 29.512 [60]. AllowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
trafficSteeringPolIdUl	It references to a pre-configured traffic steering policy for uplink traffic at the SMF, see TS 29.512 [60]. AllowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
routeToLocs	It provides a list of location which the traffic shall be routed to for the AF request. AllowedValues: N/A.	type: RouteToLocation multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: False

<table>
<tr><td>traffCorreInd</td><td>It indicates the traffic correlation.

AllowedValues: "TRUE", "FALSE".</td><td>type: Boolean
multiplicity: 1
isOrdered: N/A
isUnique: N/A
defaultValue: “FALSE”
isNullable: False</td></tr>
<tr><td>dnai</td><td>It represents the DNAI (Data network access identifier), see 3GPP TS 23.501 [2].

AllowedValues: N/A.</td><td>type: String
multiplicity: 1
isOrdered: N/A
isUnique: N/A
defaultValue: None
isNullable: False</td></tr>
<tr><td>routeInfo</td><td>It provides the traffic routing information.

AllowedValues: N/A.</td><td>type: RouteInformation
multiplicity: 1
isOrdered: N/A
isUnique: N/A
defaultValue: None
isNullable: False</td></tr>
<tr><td>ipv4Addr</td><td>It defines the Ipv4 address of the tunnel end point in the data network, formatted in the "dotted decimal" notation.

Pattern: '^(([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.){3}([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])$'.

AllowedValues: N/A.</td><td>type: String
multiplicity: 1
isOrdered: N/A
isUnique: N/A
defaultValue: None
isNullable: False</td></tr>
<tr><td>ipv6Addr</td><td>It defines the Ipv6 address of the tunnel end point in the data network.

Pattern: '^((:|(0?|([1-9a-f][0-9a-f]{0,3}))):)((0?|([1-9a-f][0-9a-f]{0,3})):){0,6}(:|(0?|([1-9a-f][0-9a-f]{0,3})))$'

and

Pattern: '^((([^:]+:){7}([^:]+))|((([^:]+:)*[^:]+)?::(([^:]+:)*[^:]+)?))$'.

AllowedValues: N/A.</td><td>type: String
multiplicity: 1
isOrdered: N/A
isUnique: N/A
defaultValue: None
isNullable: False</td></tr>
<tr><td>ipv6AddrPrefix</td><td>String identifying an IPv6 address prefix formatted according to clause 4 of IETF RFC 5952 [82]. IPv6Prefix data type may contain an individual /128 IPv6 address.
Pattern: '^((:|(0?|([1-9a-f][0-9a-f]{0,3}))):)((0?|([1-9a-f][0-9a-f]{0,3})):){0,6}(:|(0?|([1-9a-f][0-9a-f]{0,3})))(\/(([0-9])|([0-9]{2})|(1[0-1][0-9])|(12[0-8])))$'
and
Pattern: '^((([^:]+:){7}([^:]+))|((([^:]+:)*[^:]+)?::(([^:]+:)*[^:]+)?))(\/.+)$'</td><td>type: String
multiplicity: 1
isOrdered: N/A
isUnique: N/A
defaultValue: None
isNullable: False</td></tr>
<tr><td>portNumber</td><td>It defines the UDP port number of the tunnel end point in the data network, see TS 29.571 [61].

AllowedValues: N/A.</td><td>type: Integer
multiplicity: 1
isOrdered: N/A
isUnique: N/A
defaultValue: None
isNullable: False</td></tr>
<tr><td>routeProfId</td><td>It identifies the routing profile.

AllowedValues: N/A.</td><td>type: String
multiplicity: 1
isOrdered: N/A
isUnique: N/A
defaultValue: None
isNullable: False</td></tr>
<tr><td>upPathChgEvent</td><td>It contains the information about the AF subscriptions of the UP path change.

AllowedValues: N/A.</td><td>type: UpPathChgEvent
multiplicity: 1
isOrdered: N/A
isUnique: N/A
defaultValue: None
isNullable: False</td></tr>
</table>

notificationUri	It provides notification address (Uri) of AF receiving the event notification. AllowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
notifCorreId	It is used to set the value of Notification Correlation ID in the notification sent by the SMF, see TS 29.512 [60]. AllowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
dnaiChgType	It indicates the type of DNAI change, see TS 29.512 [60]. AllowedValues: “EARLY”, “EARLY_LATE”, “LATE”.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
afAckInd	It identifies whether the AF acknowledgement of UP path event notification is expected.The default value is "FALSE". AllowedValues: “TRUE”, “FALSE”.	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: “FALSE” isNullable: False
steerFun	It indicates the applicable traffic steering functionality, see TS 29.512 [60]. AllowedValues: “MPTCP”, “ATSSS_LL”.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
steerModeDl	It provides the traffic distribution rule across 3GPP and Non-3GPP accesses to apply for downlink traffic. AllowedValues: N/A.	type: SteeringMode multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
steerModeUl	It provides the traffic distribution rule across 3GPP and Non-3GPP accesses to apply for uplink traffic. AllowedValues: N/A.	type: SteeringMode multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
mulAccCtrl	It indicates whether the service data flow, corresponding to the service data flow template, is allowed or not allowed. The default value is "NOT_ALLOWED". AllowedValues: "ALLOWED", "NOT_ALLOWED".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: "NOT_ALLOWED" isNullable: False
steerModeValue	It indicates the value of the steering mode, see TS 29.512 [60]. AllowedValues: “ACTIVE_STANDBY”, “LOAD_BALANCING”, “SMALLEST_DELAY”, “PRIORITY_BASED”.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
active	It indicates the active access, see TS 29.571 [61]. AllowedValues: "3GPP_ACCESS", "NON_3GPP_ACCESS".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
standby	It indicates the Standby access, see TS 29.571 [61]. AllowedValues: "3GPP_ACCESS", "NON_3GPP_ACCESS".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

threeGLoad	It indicates the traffic load to steer to the 3GPP Access expressed in one percent. AllowedValues: 0..100.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
prioAcc	It indicates the high priority access, see TS 29.571 [61]. AllowedValues: "3GPP_ACCESS", "NON_3GPP_ACCESS".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
condId	It uniquely identifies the condition data. AllowedValues: N/A.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
activationTime	It indicates the time (in date-time format) when the decision data shall be activated, see TS 29.512 [60] and TS 29.571 [61]. AllowedValues: N/A.	type: DateTime multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
deactivationTime	It indicates the time (in date-time format) when the decision data shall be deactivated, see TS 29.512 [60] and TS 29.571 [61]. AllowedValues: N/A.	type: DateTime multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
accessType	It provides the condition of access type of the UE when the session AMBR shall be enforced, see TS 29.512 [60]. AllowedValues: "3GPP_ACCESS", "NON_3GPP_ACCESS".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
ratType	It provides the condition of RAT type of the UE when the session AMBR shall be enforced, see TS 29.512 [60] and TS 29.571 [61]. AllowedValues: "NR", "EUTRA", "WLAN", "VIRTUAL", "NBIOT", "WIRELINE", "WIRELINE_CABLE", "WIRELINE_BBF", "LTE-M", "NR_U", "EUTRA_U", "TRUSTED_N3GA", "TRUSTED_WLAN", "UTRA", "GERA".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
periodicity	It identifies the time period between the start of two bursts in reference to the TSN GM. AllowedValues: see TS 29.571 [61].	type: integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
burstArrivalTime	Indicates the arrival time (in date-time format) of the data burst in reference to the TSN GM. AllowedValues: see TS 29.571 [61].	type: DateTime multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nsacfInfoSnssaiList	It represents a list of NSACF information per S-NSSAI. AllowedValues: N/A	type: NsacfInfoSnssai multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: True

snssaiInfo	It defines generic information for a S-NSSAI. The information includes global unique identifier of a Network Slice (see [2] for definition of Network Slice) and adminstrativeState of the Network Slice AllowedValues: N/A.	type: SnssaiInfo multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
isSubjectToNsac	It defines if the Network Slice subjects to network slice admission control. The value is set to False if the maxNumberofUEs attribute in corresponding SliceProfile is absent. AllowedValues: True, False	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
NsacfInfoSnssai.maxNumberofUEs	It defines the maximum number of UEs which are allowed to be served by the Network Slice that is subject to network slice admission control. This number could be derived from maxNumberofUEs defined in corresponding SliceProfile. AllowedValues: 0 - 65535	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: 0 isNullable: False
eACMode	It represents if early admission control (EAC) mode is activated. AllowedValues: Active, Inactive	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: Inactive isNullable: False
activeEacThreshhold	It defines threshold in percentage value of the number of the UEs registered with the network slice to the maximum number of UEs allowed to register with the network slice. The eACMode is set to active when the number of the UEs registered with the network slice is above this threshold. AllowedValues: 0 - 100	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: 0 isNullable: False
deactiveEacThreshhold	It defines threshold in percentage value of the number of the UEs registered with the network slice to the maximum number of UEs allowed to register with the network slice. The eACMode is set to inactive when the number of the UEs registered with the network slice is below this threshold. AllowedValues: 0 - 100 Note: If this attribute is absent, activeEacThreshhold is used to trigger deactivation of eACMode.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: 100 isNullable: True
numberofUEs	It represents the number of the UEs registered with the network slice. This attribute is updated by NSACF. AllowedValues: 0 - 65535	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
uEIdList	It represents the UEs registered with the network slice. This attribute is updated by NSACF. AllowedValues: N/A	type: String multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: True
networkSliceInfoList	The attribute specifies a list of NetworkSliceInfo which is defined as a datatype (see clause 5.3.95). It can be used by the NWDAF to facilitate the data collection from OAM. allowedValues: N/A	type: NetworkSliceInfo multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: False

networkSliceRef	This holds a DN of the NetworkSlice managed object relating to the NetworkSlice instance differentiated by sNSSAI and optional cNSIId.	type: DN multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
sNSSAI	It represents the S-NSSAI the NetworkSlice managed object is supporting. The S-NSSAI is defined in TS 23.003 [13]. allowedValues: See TS 23.003 [13]	type: S-NSSAI multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
cNSIId	It represents NSI ID which 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 NSI ID definition in clause 3.1 of TS 23.501 [2] and subclause 6.1.6.2.7 of TS 29.531 [24].	type: String multiplicity: * isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
eCSAddrConfigInfo	It represents one or more FQDN(s) and/or IP address(es) of Edge Configuration Server(s), and of an ECS Provider ID.	type: String multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
aMFSet.aMFRegionRef	This is the DN of AMFRegion instance of the AMFSet. This holds a DN of AMFRegion instance for which the AMFSet instance belongs to. allowedValues: N/A	type: DN multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
aMFSetRef	This is the DN of AMFSet. allowedValues: N/A	type: DN multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
aMFRegion.aMFSetListRef	This holds a list of DN of AMFSet instances in the same AMFRegion instance. allowedValues: N/A	type: DN multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: True
ServerAddr	This attribute indicates the DNS server address for the PDU Session (see clause 6.2.2.2 in TS 23.548 [78]) allowedValues: Not applicable.	Type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
NsacfInfoSnssai.maxNumberofPDUSessions	It defines the maximum number of concurrent PDU sessions supported by the network slic. This number could be derived from maxNumberofPDUSessions defined in corresponding SliceProfile.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues:N/A isNullable: False
eASServiceArea	This parameter defines the EAS service area (see clause 7.3.3.6 in TS 23.558 [81]). allowedValues: N/A	type: ServingLocation multiplicity: 1 isOrdered: N/A isUnique: NA defaultValue: None isNullable: False

eESServiceArea	This parameter defines the EES service area (see clause 7.3.3.5 in TS 23.558 [81]). allowedValues: N/A	type: ServingLocation multiplicity: 1 isOrdered: N/A isUnique: NA defaultValue: None isNullable: False
eDNServiceArea	This parameter defines the EDN service area (see clause 7.3.3.4 in TS 23.558 [81]). allowedValues: N/A	type: ServingLocation multiplicity: 1 isOrdered: N/A isUnique: NA defaultValue: None isNullable: False
5GCNfConnEcmInfoList	The attribute specifies a list of 5GCNfConnInfo which is defined as a datatype (see clause 5.3.120). It is used to provide 5GC NFs, such as PCF, NEF, SCEF, that are connected EDN NFs, such as EAS, EES, and ECS. allowedValues: N/A	type: 5GCNfConnEcmInfo multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: False
5GCNFType	It indicates the type of a NF instance. AllowedValues:"PCF", "NEF", "SCEF".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
5GCNFIpAddress	This parameter defines address of a NF 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 [13]). allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
5GCNFRef	This attribute holds the DN of a NF instance. allowedValues: N/A	type: DN multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
ednIdentifier	The identifier of the edge data network (See TS 23.558 [81]). allowedValues: N/A	type: string multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
eASIpAddress	This parameter defines address of an EAS instance. It can be IP address (either IPv4 address (See RFC 791 [37]) or IPv6 address (See RFC 2373 [38]). allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
eESIpAddress	This parameter defines address of an EES instance. It can be IP address (either IPv4 address (See RFC 791 [37]) or IPv6 address (See RFC 2373 [38])). allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: NA defaultValue: None isNullable: False
eCSIpAddress	This parameter defines address of an ECS instance. It can be IP address (either IPv4 address (See RFC 791 [37]) or IPv6 address (See RFC 2373 [38])). allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: NA defaultValue: None isNullable: False

uPFConnectionInfo	The attribute is defined as a datatype UPFConnInfo (see clause 5.3.121). It is used to provide the UPF IP address and UPF DN. allowedValues: N/A	type: UPFConnInfo multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
uPFRef	This attribute holds the DN of an UPF instance. allowedValues: N/A	type: DN multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
UpfIpAddress	This parameter defines address of an UPF 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 [13]). allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
ecmConnectionType	It indicates the type of ECM connection (i.e., user plane connection via UPF, control plane connection via PCF or NEF. AllowedValues: "USERPLANE", "CONTROLPLANE", "BOTH".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: NA defaultValue: None isNullable: True

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	S	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	S	Notes
notifyMOICreation	O	--
notifyMOIDeletion	O	--
notifyMOIAttributeValueChanges	O	--
notifyMOIChanges	O	--
notifyEvent	O	--

5.5.3 Threshold Crossing 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	S	Notes
notifyThresholdCrossing	M	

5A Information model definitions for SBA support of IMS

5A.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 28.705 [xx], IOC, CSCFFunction	CSCFFunction
TS 28.705 [xx], IOC, HSSFunction	HSSFunction
TS 28.705 [xx], IOC, PCSCFFunction	PCSCFFunction

5A.2 Class diagram

5A.2.1 Class diagram for SBA support of IMS

5A.2.1.1 Relationships

The set of classes (e.g. IOCs) that encapsulate the information relevant for IMS network resource information for telecommunication network management purposes are described in TS 28.705 [72].

The set of classes IOC EP_RP for SBA support of SCSCFFunction, HSSFunction, PCSCFFunction and PCFFunction are described in this clause.

The Figure 5A.2.1.1-1 shows the transport view of SCSCFFunction NRM for SBA interfaces.

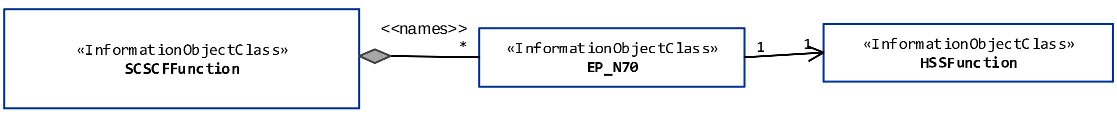


Figure 5A.2.1.1-1: Transport view of SCSCFFunction for SBA interfaces

The Figure 5A.2.1.1-2 shows the transport view of HSSFunction NRM for SBA interfaces.

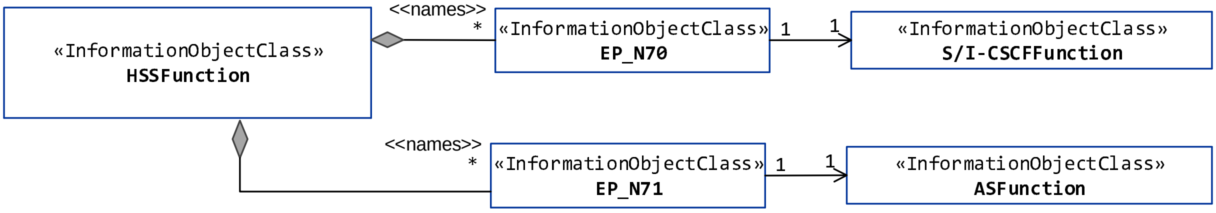


Figure 5A.2.1.1-2: Transport view of HSSFunction for SBA interfaces

The Figure 5A.2.1.1-3 shows the transport view of PCFFunction NRM for SBA interfaces.

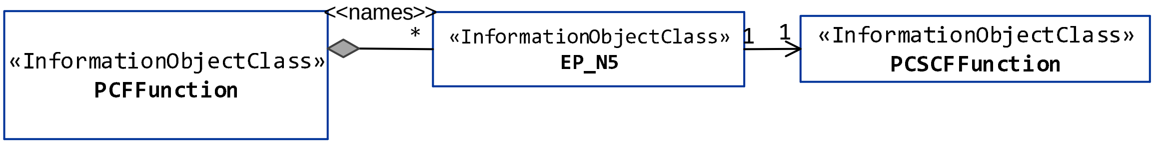


Figure 5A.2.1.1-3: Transport view of PCFFunction for SBA interfaces

The Figure 5A.2.1.1-4 shows the transport view of PCSCFFunction NRM for SBA interfaces.

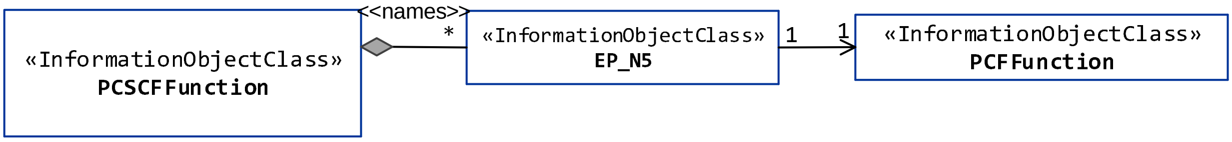


Figure 5A.2.1.1-4: Transport view of PCSCFFunction for SBA interfaces

5A.2.1.2 Inheritance

Figure 5A.2.1.2-1 shows the inheritance hierarchy from IOC EP_RP related to SBA interfaces of IMS nodes.

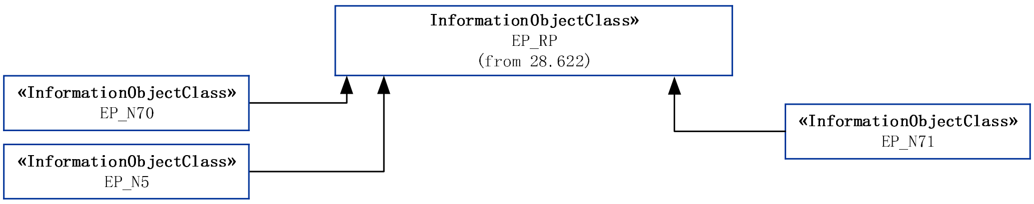


Figure 5A.2.1.2-1: Inheritance hierarchy from IOC EP_RP related to SBA interfaces of IMS

5A.3 Class definitions

5A.3.1 EP_N5

5A.3.1.1 Definition

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

5A.3.1.2 Attributes

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5A.3.2 EP_N70

5A.3.2.1 Definition

This IOC represents the N70 interface between S/I-CSCF and HSS, which is defined in 3GPP TS 23.501 [2].

5A.3.2.2 Attributes

The EP_N70 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

5A.3.3 EP_N71

5A.3.3.1 Definition

This IOC represents the N71 interface between AF and HSS, which is defined in 3GPP TS 23.501 [2].

5A.3.3.2 Attributes

The EP_N71 IOC includes attributes inherited from EP_RP IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
localAddress	O	T	T	F	T
remoteAddress	O	T	T	F	T

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

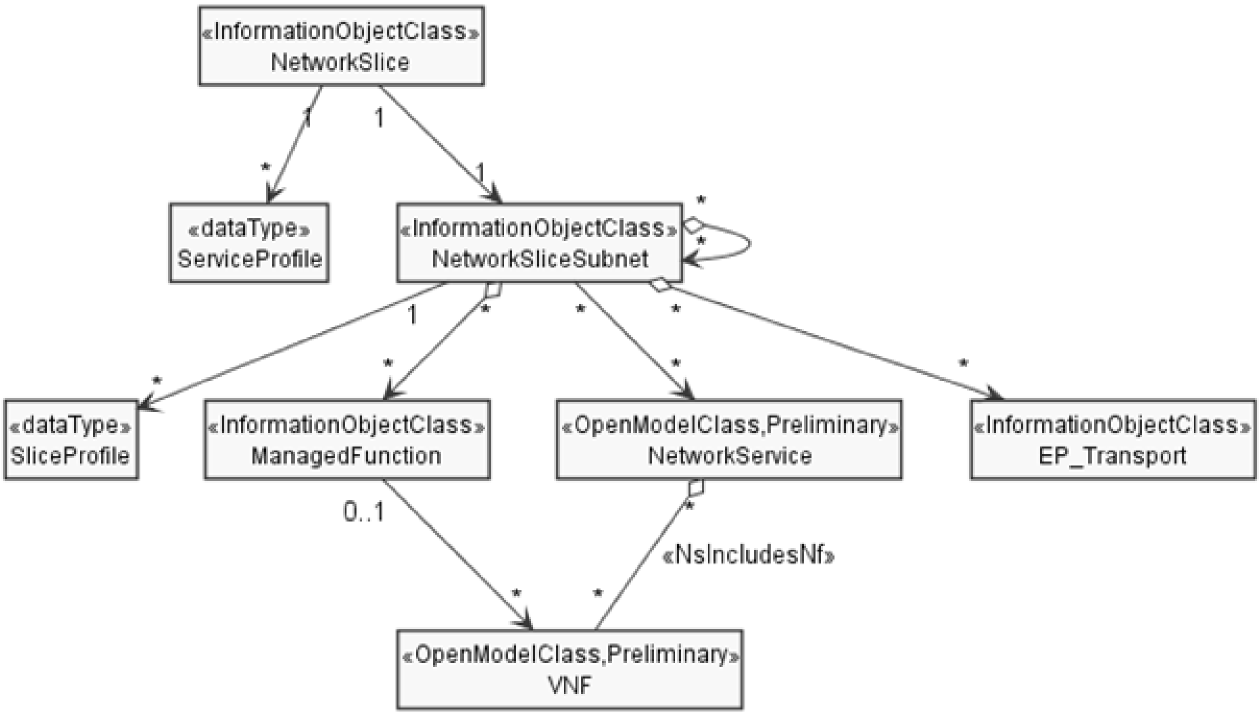


Figure 6.2.1-1: Network slice NRM fragment relationship

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.

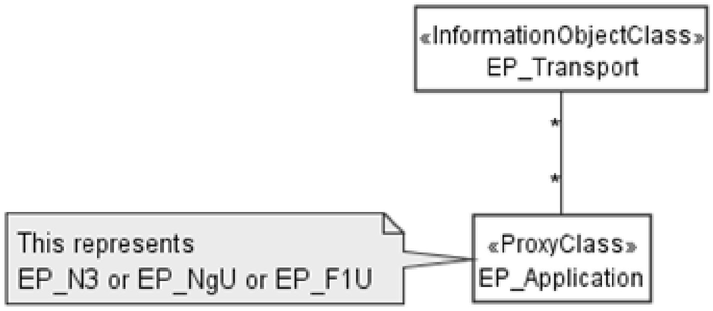


Figure 6.2.1-2: Transport EP NRM fragment relationship

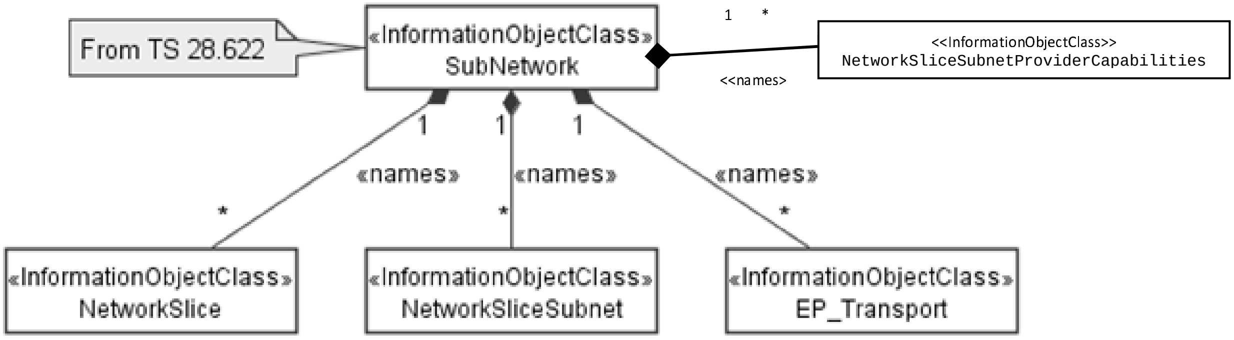


Figure 6.2.1-3: containment relationship for network slice fragment

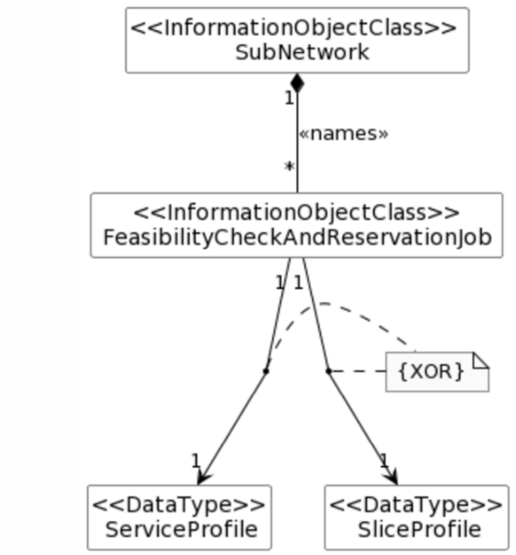


Figure 6.2.1-4: containment relationship for feasibility check and resource reservation NRM fragment

6.2.2 Inheritance

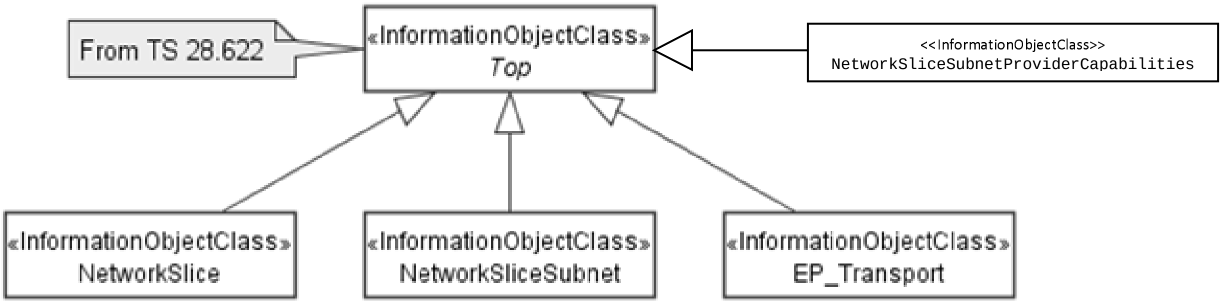


Figure 6.2.2-1: Network slice inheritance relationship

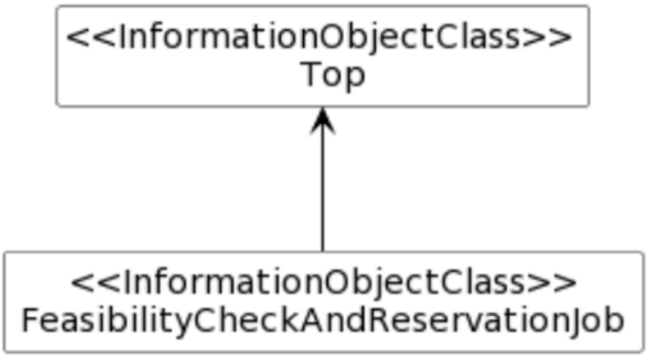


Figure 6.2.2-2: inheritance relationship for feasibility check NRM fragment

6.3 Class definitions

6.3.1 `NetworkSlice`

6.3.1.1 Definition

This IOC represents the properties of a network slice in a 5G network. For more information about the network slice, see 3GPP TS 28.530 [70].

6.3.1.2 Attributes

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

Attribute name	S	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 in a 5G network. For more information about the network slice subnet instance, see 3GPP TS 28.530 [70].

The NetworkSliceSubnet can be categorized by following types:

- RANSliceSubne represent the RAN network slice subnet in a 5G network, which is associated to one or multiple "RANSliceSubnetProfile".
- CNSliceSubnet represent the CN network slice subnet in a 5G network, which is associated to one or multiple "CNSliceSubnetProfile".
- TopSliceSubnet represent the top network slice subnet in a 5G network, which is associated to one or multiple "TopSliceSubnetProfile".

The attribute epTransportRef is used to specify a list of EP_Transport instance as transport resources to be aggregated to a NetworkSliceSubnet instance. The MnS consumer determines the EP_Transport instance(s) to support EP_Application instances as part of the NetworkSliceSubnet instance and request the MnS producer to configure the attribute epTransportRef of the NetworkSliceSubnet.

The EP_Transport is name contained by SubNetwork, and an EP_Transport instance can be a new instance created for the EP_Application instances as part of NetworkSliceSubnet instance or an existing instance reused for EP_Application instance.

6.3.2.2 Attributes

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

Attribute name	S	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
priorityLabel	O	T	T	F	T
networkSliceSubnetType	O	T	T	F	T
Attribute related to role					
managedFunctionRef	M	T	F	F	T
networkSliceSubnetRef	M	T	F	F	T
epTransportRef	O	T	T	F	T

6.3.2.3 Attribute constraints

Name	Definition
nsInfo S	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 the network slice related requirements that should be supported by a NetworkSlice instance in a 5G network. The network slice related requirements apply to a one-to-one relationship between a Network Slice Customer (NSC) and a Network Slice Provider (NSP). A network slice can be tailored based on the specific requirements adhered to an SLA agreed between NSC and NSP, see clause 2 of [50]. An NSP may add additional requirements not directly derived from SLA’s, associated to the NSP 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	S	isReadable	isWritable	isInvariant	isNotifyable
serviceProfileId	M	T	F	T	T
pLMNInfoList	M	T	F	F	T
maxNumberofUEs	O	T	T	F	T
coverageArea	O	T	T	F	T
dLLatency	O	T	T	F	T
uLLatency	O	T	T	F	T
uEMobilityLevel	O	T	T	F	T
networkSliceSharingIndicator	O	T	T	F	T
sST	M	T	T	F	T
availability	O	T	T	F	T
delayTolerance	O	T	T	F	T
dLDeterministicComm	O	T	T	F	T
uLDeterministicComm	O	T	T	F	T
dLThptPerSlice	O	T	T	F	T
dLThptPerUE	O	T	T	F	T
uLThptPerSlice	O	T	T	F	T
uLThptPerUE	O	T	T	F	T
dLMaxPktSize	O	T	T	F	T
uLMaxPktSize	O	T	T	F	T
maxNumberofPDUSessions	O	T	T	F	T
kPIMonitoring	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
radioSpectrum	O	T	T	F	T
reliability	O	T	T	F	T
maxDLDataVolume	O	T	T	F	T
maxULDataVolume	O	T	T	F	T
nBIoT	O	T	T	F	T
synchronicity	O	T	T	F	T
positioning	O	T	T	F	T
sliceSimultaneousUse	O	T	T	F	T
energyEfficiency	O	T	T	F	T
nssaaSupport	O	T	T	F	T
n6Protection	O	T	T	F	T

NOTE: The attributes in ServiceProfile represent mapped requirements from an NSC (e.g. an enterprise) to an NSP

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 NetworkSliceSubnet instance in a 5G network.

6.3.4.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
sliceProfileId	M	T	F	T	T
pLMNInfoList	M	T	T	F	T
CNSliceSubnetProfile	CM	T	T	F	T
RANSliceSubnetProfile	CM	T	T	F	T
TopSliceSubnetProfile	CM	T	T	F	T

6.3.4.3 Attribute constraints

Name	Definition
CNSliceSubnetProfile S	Condition: It shall be present when the slice profile defines requirements for CN domain
RANSliceSubnetProfile S	Condition: It shall be present when the slice profile defines requirements for RAN domain.
TopSliceSubnetProfile S	Condition: It shall be present when the slice profile is for top/root network slice subnet

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	S	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>>

6.3.6.1 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	S	isReadable	isWritable	isInvariant	isNotifyable
category	M	T	F	T	T
tagging	CM	T	F	T	T
exposure	M	T	F	T	T

6.3.6.3 Attribute constraints

Name	Definition
tagging S	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	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	T	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.

6.3.8 DeterminComm <<dataType>>

6.3.8.1 Definition

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

6.3.8.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	CM	T	T	F	T
availability	M	T	F	F	T
periodicityList	M	T	T	F	T

6.3.8.3 Attribute constraints

Name	Definition
servAttrCom S	Condition: This attribute is mandatory only *when requirements are being defined on* deterministic communication for periodic user traffic per network slice (GSMA attribute). Otherwise, the attribute is optional.

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 XLThpt<<dataType>>

6.3.9.1 Definition

This data type can be used to represent downlink or uplink throughput per network slice , per network slice subnet,or per UE in a network slice (see clause 3.4.5, 3.4.6, 3.4.31 and 3.4.32 of GSMA NG.116 [50]).

6.3.9.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	CM	T	F	F	T
guaThpt	O	T	F	F	T
maxThpt	O	T	F	F	T

6.3.9.3 Attribute constraints

Name	Definition
servAttrCom S	Condition: This [attribute] is mandatory only *when requirements are being defined on* throughput per: network slice (GSMA attribute), per UE in a network slice (GSMA attribute). Otherwise, the attribute is optional.

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 Void

6.3.11 MaxPktSize <<dataType>>

6.3.11.1 Definition

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

6.3.11.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	CM	T	F	T	T
maxSize	M	T	T	F	T

6.3.11.3 Attribute constraints

Name	Definition
servAttrCom S	Condition: This attribute is mandatory only *when requirements are being defined on* maximum packet size per network slice (GSMA attribute). Otherwise, the attribute is optional.

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 MaxNumberofPDUSessions <<dataType>>

6.3.12.1 Definition

This data type represents the maximum number of concurrent PDU sessions supported by the network slice (see clause 3.4.16 of GSMA NG.116 [50]).

6.3.12.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	T	T
nOofPDUSessions	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 Void

6.3.14 KPIMonitoring <<dataType>>

6.3.14.1 Definition

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

6.3.14.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	T	T
kPIList	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 UserMgmtOpen<<dataType>>

6.3.15.1 Definition

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

6.3.15.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	T	T
support	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 V2XCommMode<<dataType>>

6.3.16.1 Definition

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

6.3.16.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	T	T
v2XMode	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 TermDensity<<dataType>>

6.3.17.1 Definition

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

6.3.17.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	T	T
density	M	T	F	F	T

6.3.17.3 Attribute constraints

None.

6.3.17.4 Notifications

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

6.3.18 EP_Transport

6.3.18.1 Definition

This IOC represents the logical transport interface or endpoint which is part of a RAN or CN `SubNetwork`,including transport level information, e.g. transport address, reachability information and QoS profiles, etc.

MnS consumer can request MnS producer to create an `EP_transport` instance for one or multiple `EP_Application` instance(s) of one or multiple `NetworkSliceSubnet(s).`

The attribute "`epApplicationRef`" is used to specify a list of `EP_N3` instances and `EP_NgU` instances aggregated to the `EP_transport` instance.

MnS consumer can obtain all the information of the `EP_Transport` associated to a `NetworkSliceSubnet` from MnS producer and send to corresponding TN Management System as transport network related requirements.

6.3.18.2 Attributes

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

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
ipAddress	M	T	F	F	T
logicalInterfaceInfo	M	T	T	F	T
nextHopInfoList	O	T	F	F	T
qosProfile	O	T	T	F	T
Attribute related to role					
epApplicationRef	M	T	T	F	T

6.3.18.3 Attribute constraints

None.

6.3.18.4 Notifications

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

6.3.19 EP_Application <<ProxyClass>>

6.3.19.1 Definition

This represents <<IOC>>EP_N3 or <<IOC>>EP_NgU or <<IOC>>EP_F1U.

6.3.19.2 Attributes

See that defined in <<IOC>>EP_N3 or <<IOC>>EP_NgU or <<IOC>>EP_F1U.

6.3.19.3 Attribute constraints

See respective IOCs.

6.3.19.4 Notifications

See respective IOCs.

6.3.20 NBIoT <<dataType>>

6.3.20.1 Definition

This data type represents NB-IoT Support (see clause 3.4.14 of GSMA NG.116 [50]).

6.3.20.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	T	T
support	M	T	F	F	T

6.3.20.3 Attribute constraints

None.

6.3.20.4 Notifications

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

6.3.21 Void

6.3.22 Void

6.3.23 CNSliceSubnetProfile<<dataType>>

6.3.23.1 Definition

This data type represents the requirements for CN slice profile.

6.3.23.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
maxNumberofUEs	O	T	T	F	T
dLLatency	O	T	T	F	T
uLLatency	O	T	T	F	T
dLThptPerSliceSubnet	O	T	T	F	T
dLThptPerUE	O	T	T	F	T
uLThptPerSliceSubnet	O	T	T	F	T
uLThptPerUE	O	T	T	F	T
maxNumberOfPDUSessions	O	T	T	F	T
coverageAreaTAList	O	T	T	F	T
reliability	O	T	T	F	T
resourceSharingLevel	O	T	T	F	T
dLMaxPktSize	O	T	T	F	T
uLMaxPktSize	O	T	T	F	T
sliceSimultaneousUse	O	T	T	F	T
delayTolerance	O	T	T	F	T
energyEfficiency	O	T	T	F	T
dLDeterministicComm	O	T	T	F	T
uLDeterministicComm	O	T	T	F	T
survivalTime	O	T	T	F	T
nssaaSupport	O	T	T	F	T
n6Protection	O	T	T	F	T

6.3.23.3 Attribute constraints

None.

6.3.23.4 Notifications

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

6.3.24 RANSliceSubnetProfile<<dataType>>

6.3.24.1 Definition

This data type represents the requirements for RAN slice profile.

6.3.24.2 Attributes

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

6.3.24.3 Attribute constraints

None.

6.3.24.4 Notifications

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

6.3.25 TopSliceSubnetProfile<<dataType>>

6.3.25.1 Definition

This data type represents the requirements for a top network slice subnet, a network slice subnet directly associated with the network slice. It includes an aggregated list of the attributes from `RANSliceSubnetProfile` and `CNSliceSubnetProfile`.

6.3.25.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
dLLatency	O	T	T	F	T
uLLatency	O	T	T	F	T
maxNumberofUEs	O	T	T	F	T
dLThptPerSliceSubnet	O	T	T	F	T
dLThptPerUE	O	T	T	F	T
uLThptPerSliceSubnet	O	T	T	F	T
uLThptPerUE	O	T	T	F	T
dLMaxPktSize	O	T	T	F	T
uLMaxPktSize	O	T	T	F	T
maxNumberOfPDUSessions	O	T	T	F	T
nROperatingBands	O	T	T	F	T
sliceSimultaneousUse	O	T	T	F	T
delayTolerance	O	T	T	F	T
energyEfficiency	O	T	T	F	T
termDensity	O	T	T	F	T
activityFactor	O	T	T	F	T
coverageAreaTAList	O	T	T	F	T
resourceSharingLevel	O	T	T	F	T
uEMobilityLevel	O	T	T	F	T
uESpeed	O	T	T	F	T
reliability	O	T	T	F	T
sST	O	T	T	F	T
dLDeterministicComm	O	T	T	F	T
uLDeterministicComm	O	T	T	F	T
survivalTime	O	T	T	F	T
positioning	O	T	T	F	T
synchronicity	O	T	T	F	T
nssaaSupport	O	T	T	F	T
n6Protection	O	T	T	F	T

6.3.25.3 Attribute constraints

None.

6.3.25.4 Notifications

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

6.3.26 Positioning <<dataType>>

6.3.26.1 Definition

This data type represents positioning support (see clause 3.4.20 of GSMA NG.116 [50]).

6.3.26.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	T	T
availability	O	T	F	F	T
predictionfrequency	O	T	T	F	T
accuracy	O	T	T	F	T

6.3.26.3 Attribute constraints

None.

6.3.26.4 Notifications

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

6.3.27 Synchronicity <<dataType>>

6.3.27.1 Definition

This data type represents synchronicity support (see clause 3.4.29 of GSMA NG.116 [50]).

6.3.27.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	T	T
availability	O	T	F	F	T
accuracy	O	T	T	F	T

6.3.27.3 Attribute constraints

None.

6.3.27.4 Notifications

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

6.3.28 PositioningRANSubnet <<dataType>>

6.3.28.1 Definition

This data type represents positioning support in RAN domain (see clause 6.3.25).

6.3.28.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
availability	O	T	F	F	T
predictionfrequency	O	T	T	F	T
accuracy	O	T	T	F	T

6.3.28.3 Attribute constraints

None.

6.3.28.4 Notifications

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

6.3.29 SynchronicityRANSubnet <<dataType>>

6.3.29.1 Definition

This data type represents synchronicity support in RAN domain (see clause 3.4.29 of GSMA NG.116 [50]).

6.3.29.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
availability	O	T	F	F	T
accuracy	O	T	T	F	T

6.3.29.3 Attribute constraints

None.

6.3.29.4 Notifications

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

6.3.30 EnergyEfficiency <<dataType>>

6.3.30.1 Definition

This data type represents `energyEfficiency` support (see clause 3.4.7 of GSMA NG.116 [50]).

6.3.30.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	T	T
performance	O	T	T	F	T

6.3.30.3 Attribute constraints

None.

6.3.30.4 Notifications

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

6.3.31 RadioSpectrum <<dataType>>

6.3.31.1 Definition

This data type represents the radio spectrum in which the network slice should be supported (see clause 3.4.21 of GSMA NG.116 [50]).

6.3.31.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	T	T
nROperatingBands	M	T	T	F	T

6.3.31.3 Attribute constraints

None.

6.3.31.4 Notifications

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

6.3.32 N6Protection <<dataType>>

6.3.32.1 Definition

This data type defines required security functions and corresponding rules of each function. It represents the N6 interface protection information in ServiceProfile and CNSliceSubnetProfile for CN.

6.3.32.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	CM	T	T	T	T
secFuncList	M	T	T	F	T

6.3.32.3 Attribute constraints

Name	Definition
servAttrCom S	Condition: Only valid when the attribute is in ServiceProfile. Otherwise this attribute shall be absent.

6.3.32.4 Notifications

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

6.3.33 SecFunc <<dataType>>

6.3.33.1 Definition

This data type defines each security control functions/features required by the Network Slice or Network Slice Subnet consumer. E.g. Firewall, NAT, antimalware, parental control, DDoS protection function, etc.

6.3.33.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
secFunId	M	T	F	T	T
secFunType	M	T	F	F	T
secRules	O	T	T	T	T

6.3.33.3 Attribute constraints

None.

6.3.33.4 Notifications

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

6.3.34 NSSAASupport <<dataType>>

6.3.34.1 Definition

This data type represents the Network Slice Specific Authentication and Authorization (NSSAA) (See Clause 3.4.37 of GSMA NG.116 [50]).

6.3.34.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
servAttrCom	M	T	F	T	T
support	M	T	F	F	T

6.3.34.3 Attribute constraints

None.

6.3.34.4 Notifications

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

6.3.35 LogicalInterfaceInfo <<dataType>>

6.3.35.1 Definition

This data type represents the logical interface information of the logical transport interface.

6.3.35.2 Attributes

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
logicalInterfaceType	M	T	T	F	T
logicalInterfaceId	M	T	T	F	T

6.3.35.3 Attribute constraints

None.

6.3.35.4 Notifications

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

6.3.36 NetworkSliceSubnetProviderCapabilities

6.3.36.1 Definition

The NetworkSliceSubnetProviderCapabilities IOC store the capabilities/features of the network slice subnet provider in terms of network slice subnets it can manage/provide. The attributes of this IOC can be queried, using getMOIAttributes operation, to know the capabilities of the provider. Based on the capabilities decision can be made e.g derivation of subnet requirements by the consumer.

6.3.36.2 Attributes

The NetworkSliceSubnetProviderCapabilities IOC includes attributes inherited from Top IOC (defined in TS 28.622[30]) and the following attributes. The attributes here are subjected to updates, e.g. after each successful subnet allocation or because of any other operator internals decision.

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
`dLlatency`	M	T	F	F	T
`uLlatency`	M	T	F	F	T
`dLThptPerSliceSubnet`	M	T	F	F	T
`uLThptPerSliceSubnet`	M	T	F	F	T
`coverageAreaTAList`	M	T	F	F	T

6.3.36.3 Attribute constraints

None

6.3.36.4 Notifications

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

6.3.37 FeasibilityCheckAndReservationJob

6.3.37.1 Definition

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

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

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

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

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

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

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

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

MnS producer will use the reserved resources to satisfy the corresponding network slicing related requirements in the allocation request. In case to use the reserved resources, MnS consumer will use the same ServiceProfileId or SliceProfileId value (which is obtained/queried from the FeasibilityCheckAndReservationJob) as input parameters for allocation request.

Editor's Note: the association mechanism for reserved resource and allocation may need to be updated based on further investigation.

6.3.37.2 Attributes

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

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

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

6.3.37.3 Attribute constraints

Name	Definition
`sliceProfile` Support Qualifier	Condition: The feasibilitycheckjob is used to check the feasibility for network slice subnet related requirements.
`serviceProfile` Support Qualifier	Condition: The feasibilitycheckjob is used to check the feasibility for network slice related requirements.

6.3.37.4 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: Real 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.	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.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
operationalState	It indicates the operational state of the network slice or the network slice subnet. It describes whether or not the resource is physically installed and working. allowedValues: "ENABLED", "DISABLED". The meaning of these values is as defined in 3GPP TS 28.625 [17] and ITU-T X.731 [18].	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
administrativeState	It indicates the administrative state of the network slice or the network slice subnet. It describes the permission to use or prohibition against using the managed object instance, imposed through the OAM services. allowedValues: “LOCKED”, “UNLOCKED”, SHUTTINGDOWN” The meaning of these values is as defined in 3GPP TS 28.625 [17] and ITU-T X.731 [18].	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: LOCKED 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 category (see GSMA NG.116 [50]). allowedValues: performance, function, operation	type: ENUM multiplicity: 1…3 isOrdered: False isUnique: True 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
`maxNumberofUEs`	An attribute specifies the maximum number of UEs may simultaneously access the network slice or network slice subnet 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 Tracking Areas for the network slice . allowedValues: Legacy TAC and Extended TAC are defined in clause 9.3.3.10 of TS 38.413 [5].	type: Integer multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
`dLLatency`	An attribute specifies the required DL packet transmission latency (millisecond) through the RAN, CN, and TN part of 5G network and is used to evaluate utilization performance of the end-to-end network slice. See clause 6.3.1 of 28.554 [27].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
`uLLatency`	An attribute specifies the required UL packet transmission latency (millisecond) through the RAN, CN, and TN part of 5G network and is used to evaluate utilization performance of the end-to-end network slice. See clause 6.3.1 of 28.554 [27].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
`topSliceSubnetProfile.dLLatency`	An attribute specifies the required DL packet transmission latency (millisecond) through all domains of the network slice and is used to evaluate utilization performance of the end-to-end network slice. See clause 6.3.1 of 28.554 [27].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
`topSliceSubnetProfile.uLLatency`	An attribute specifies the required UL packet transmission latency (millisecond) through all domains of the network slice and is used to evaluate utilization performance of the end-to-end network slice. See clause 6.3.1 of 28.554 [27].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False

CNSliceSubnetProfile.dLLatency	An attribute specifies the required DL packet transmission latency (millisecond) through CN domain of the network slice and is used to evaluate the delay in CN domain, e.g. time between received DL packet on N6 interface of UPF and successfully sent out the packet on N3 interface.	type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
CNSliceSubnetProfile.uLLatency	An attribute specifies the required UL packet transmission latency (millisecond) through CN domain of the network slice and is used to evaluate the delay in CN domain, e.g. time between received UL packet on N3 interface of UPF and successfully sent out the packet on N6 interface.	type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
RANSliceSubnetProfile.dLLatency	An attribute specifies the required DL packet transmission latency (millisecond) through RAN domain of the network slice and is used to evaluate the delay in RAN domain, e.g. time between received DL packet on NG-U of gNB and successfully sent out the packet on air interface of the gNB.	type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
RANSliceSubnetProfile.uLLatency	An attribute specifies the required UL packet transmission latency (millisecond) through RAN domain of the network slice and is used to evaluate the delay in RAN domain, e.g. time between received UL packet on air interface of gNB and successfully sent out the packet on NG-U interface of the gNB.	type: Real 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. 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
networkSliceSharingIndicator	The attribute specifies whether a service, defined by the ServiceProfile, can share a NetworkSlice instance with other services or not. If "non-shared" the service needs a dedicated NetworkSlice instance. If "shared" the service may share a NetworkSlice instance with other service(s). allowedValues: shared, non-shared.	type: Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
serviceProfile.pLMNInfoList	It defines which PLMN and S-NSSAI combinations that are assigned for the service to satisfy service requirements represented by the ServiceProfile in case of network slicing feature is supported. allowedValues: Not applicable.	type: PLMNInfo multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: False
sliceProfile.pLMNInfoList	It defines which PLMN and S-NSSAI combinations that are served by the SliceProfile in case of network slicing feature is supported. allowedValues: Not applicable.	type: PLMNInfo multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: False
sliceProfile.resourceSharingLevel	An attribute specifies whether the resources to be allocated to the network slice subnet may be shared with another network slice subnet(s). allowedValues: shared, non-shared.	type: 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	type: ServiceProfile multiplicity: * isOrdered: False isUnique: True 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. All members of the list, instances of SliceProfile, shall contain the same datatype representing slice profile requirements: TopSliceSubnetProfile, RANSliceSubnetProfile or CNSliceSubnetProfile. E.g. the sliceProfileList may contain only instances of sliceProfile containing RANSliceSubnetProfile datatype; the sliceProfileList may not contain instances of sliceProfile containing RANSliceSubnetProfile and CNSliceSubnetProfile datatypes Members of the list may contain TopSliceSubnetProfile datatype only when this attribute (sliceProfileList) belongs to a NetworkSliceSubnet that is directly referenced by a NetworkSlice	type: SliceProfile multiplicity: * isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
sST	This attribute specifies the slice/service type in a ServiceProfile to be supported by a network slice or in a service slice profile (represented by TopSliceSubnetProfile data type and RANSliceSubnetProfile data type) to be supported by a network slice subnet. See standardised SST values in clause 5.15.2 of 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 network slice supports service delivery flexibility, especially for the vertical services that are not chasing a high system performance. allowedValues: "NOT SUPPORTED", "SUPPORTED".	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
dLDeterministicComm	An attribute specifies the properties of the deterministic communication in downlink for periodic user traffic, see clause 4.3 of TS 22.104 [51].	type: DeterministicComm multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
uLDeterministicComm	An attribute specifies the properties of the deterministic communication in uplink for periodic user traffic, see clause 4.3 of TS 22.104 [51].	type: DeterministicComm multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
DeterministicComm.availability	An attribute specifies whether or not the network slice supports deterministic communication for period user traffic. allowedValues: "NOT SUPPORTED", "SUPPORTED".	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
DeterministicComm.periodicityList	An attribute specifies a list of periodicities supported by the network slice for deterministic communication.	type: Real 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: XLThpt multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False

dLThptPerSliceSubnet	This attribute defines required data rate of the network slice subnet in downlink that should be available ubiquitously across the coverage area of the slice.	type: XLThpt 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: XLThpt multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
guaThpt	This attribute describes the guaranteed data rate.	type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
maxThpt	This attribute describes the maximum data rate.	type: Real 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: XLThpt 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: XLThpt multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
uLThptPerSliceSubnet	This attribute defines required data rate of the network slice subnet in uplink that should be available ubiquitously across the coverage area of the slice.	type: XLThpt multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
dLMaxPktSize	This parameter specifies the maximum packet size supported by the network slice or the network slice subnet, in downlink refer NG.116 [50].	type: MaxPktSize multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
uLMaxPktSize	This parameter specifies the maximum packet size supported by the network slice or the network slice subnet in uplink, 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

maxNumberofPDUSessions	This parameter defines the maximum number of concurrent PDU sessions supported by the network slice, refer NG.116 [50].	type: MaxNumberofPDUSessions multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
MaxNumberofPDUSessions.nOofPDUSessions	This parameter defines the maximum number of concurrent PDU 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
nBIoT	An attribute specifies whether NB-IoT is supported in the RAN in the network slice, see NG.116 [50].	type: NBIoT multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
NBIoT.support	An attribute specifies whether NB-IoT is supported in the RAN in the network slice, see NG.116 [50]. allowedValues: "NOT SUPPORTED", "SUPPORTED".	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
synchronicity	An attribute specifies whether synchronicity of communication devices is supported, Two cases are most important in this context, see clause 3.4.29 of NG.116 [50]: - Synchronicity between a base station and a mobile device and - Synchronicity between mobile devices.	type: Synchronicity multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
Synchronicity.availability	An attribute specifies whether synchronicity of communication devices is supported, see NG.116 [50]. allowedValues: "NOT SUPPORTED", "BETWEEN BS AND UE", "BETWEEN BS AND UE & UE AND UE".	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
Synchronicity.accuracy	An attribute specifies the accuracy of the synchronicity, see NG.116 [50].	type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
RANSliceSubnetProfile.synchronicity	An attribute specifies whether synchronicity of communication devices is supported in the RAN domain, Two cases are most important in this context, see clause 3.4.29 of NG.116 [50]: - Synchronicity between a base station and a mobile device and - Synchronicity between mobile devices.	type: SynchronicityRANSubnet multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False

SynchronicityRANSubnet.availability	An attribute specifies whether synchronicity of communication devices is supported in the RAN domain, see NG.116 [50]. allowedValues: "NOT SUPPORTED", "BETWEEN BS AND UE", "BETWEEN BS AND UE & UE AND UE".	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
SynchronicityRANSubnet.accuracy	An attribute specifies the accuracy of the synchronicity in the RAN domain, see NG.116 [50].	type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
userMgmtOpen	An attribute specifies whether or not the network slice supports the capability for the NSC to manage their users or groups of users' network services and corresponding requirements.	type: UserMgmtOpen multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
UserMgmtOpen.support	An attribute specifies whether or not the network slice supports the capability for the NSC to manage their users or groups of users' network services and corresponding requirements. allowedValues: "NOT SUPPORTED", "SUPPORTED".	type: <<enumeration>> multiplicity: 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 network slice.	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 network slice. 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
positioning	An attribute specifies whether the network slice provides geo-localization methods or supporting methods, see clause 3.4.20 of NG.116 [50].	type: Positioning multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False

Positioning.availability	An attribute specifies if this attribute is provided by the network slice and contains a list of positioning methods provided by the slice. If the list is empty this attribute is not available in the network slice and the other parameters might be ignored, see NG.116 [50]. Comma separated multiple values are allowed: CIDE-CID (LTE and NR), OTDOA (LTE and NR), RF fingerprinting, AECID, Hybrid positioning, NET-RTK.	type: ENUM multiplicity: 1..6 isOrdered: False isUnique: True defaultValue: False isNullable: False
Positioning.predictionfrequency	An attribute specifies how often location information is provided. This parameter simply defines how often the customer is allowed to request location information. This is not related to the time it takes to determine the location, which is a characteristic of the positioning method, see NG.116 [50]. allowedValues: "PERSEC", "PERMIN", "PERHOUR".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
Positioning.accuracy	An attribute specifies the accuracy of the location information. Accuracy depends on the respective positioning solution applied in the network slice, see NG.116 [50].	type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
RANSliceSubnetProfile.positioning	An attribute specifies whether the RAN domain of the network slice provides geo-localization methods or supporting methods, see clause 3.4.20 of NG.116 [50].	type: PositioningRANSubnet multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
PositioningRANSubnet.availability	An attribute specifies if this attribute is provided by the RAN domain of the network slice and contains a list of positioning methods provided by the RAN domain. If the list is empty this attribute is not available in the RAN domain and the other parameters might be ignored, see NG.116 [50]. Comma separated multiple values are allowed: CIDE-CID (LTE and NR), OTDOA (LTE and NR), RF fingerprinting, AECID, Hybrid positioning, NET-RTK.	type: ENUM multiplicity: 1..6 isOrdered: False isUnique: True defaultValue: False isNullable: False
PositioningRANSubnet.predictionfrequency	An attribute specifies how often location information is provided. This parameter simply defines how often the customer is allowed to request location information. This is not related to the time it takes to determine the location, which is a characteristic of the positioning method, see NG.116 [50]. allowedValues: "PERSEC", "PERMIN", "PERHOUR".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
PositioningRANSubnet.accuracy	An attribute specifies the accuracy of the location information. Accuracy depends on the respective positioning solution applied in the RAN domain of the network slice, measurement unit is meter, see NG.116 [50].	type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
activityFactor	An attribute specifies the percentage value of the amount of simultaneous active UEs to the total number of UEs where active means the UEs are exchanging data with the network. See Table 7.1-1 of TS 22.261 [28]).	type: Real 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 or network slice subnet 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.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: True
survivalTime	An attribute specifies the time (millisecond) that an application consuming a communication service may continue without an anticipated message. See clause 5 of TS 22.104 [51]).	type: Real 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: Real 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: False isUnique: True defaultValue: None isNullable: False
managedFunctionRef	This holds a list of DN of ManagedFunction instances supporting the NetworkSliceSubnet instance.	type: DN multiplicity: * isOrdered: False isUnique: True defaultValue: None allowedValues: N/A isNullable: False
ipAddress	This parameter specifies the IP address assigned to a logical transport interface/endpoint which is part of a RAN or CN SubNetwork. It can be an IPv4 address (See RFC 791 [37]) or an IPv6 address (See RFC 2373 [38]). See note 1	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
logicalInterfaceInfo	This parameter specifies the information of a logical transport interface (LogicalInterfaceInfo), which includes logicalInterfaceType and logicalInterfaceId.	type: LogicalInterfaceInfo multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
logicalInterfaceType	This parameter specifies the type of a logical transport interface. It could be VLAN, MPLS or Segment. Allowed Value: VLAN,MPLS,Segment	type:Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

logicalInterfaceId	This parameter specifies the identify of a logical transport interface which is part of a RAN or CN SubNetwork. It could be VLAN ID (See IEEE 802.1Q [39]), MPLS Tag or Segment ID. In case logical transport interface is VLAN, it is VLAN Id (See IEEE 802.1Q [39]). In case logical transport interface is MPLS, it is MPLS Tag. In case logical transport interface is Segment, it is Segment ID.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nextHopInfoList	This parameter is used to identify ingress node (s) which are part of a transport network and the attachment circuit between a RAN or CN SubNetwork and the transport network. Each node can be identified by any of a combination of - IP address of next-hop router (the ingress node) in the transport network, it may be default GW, - IP address and subnet mask of the attachment circuit at a RAN or CN Subnetwork end, - system name, - port name, - VLAN ID, - IP management address of transport nodes. It can use L3SM (See RFC8299 [83]) or L2SM (See RFC8466 [84]) in the case that the next-hop router is an L3VPN or L2VPN PE.	type: String multiplicity: * isOrdered: False isUnique: N/A defaultValue: None isNullable: True
qosProfile	This parameter specifies the QoS Profile for a logical transport interface. A QoS profile includes a set of parameters which are locally provisioned on both sides of a logical transport interface. An example of the parameter value could be "DSCP" (See RFC 8436 [74])	type: String multiplicity: 1 isOrdered: N/A isUnique: True defaultValue: None isNullable: True
maxDLDataVolume	An attribute specifies the maximum DL PDCP data volume supported by the network slice instance (performance measurement definition see in TS 28.552[69]). The unit is MByte/day.	type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
maxULDataVolume	An attribute specifies the maximum UL PDCP data volume supported by the network slice instance (performance measurement definition see in TS 28.552[69]). The unit is MByte/day.	type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
radioSpectrum	This attribute represents the radio spectrum in which the network slice should be supported (see clause 3.4.21 of GSMA NG.116 [50]).	type: RadioSpectrum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
nROperatingBands	This attribute represents which 5G NR frequency bands can be used to access the network slice. 5G NR operating bands are defined in 3GPP TS 38.101-1 [42].	type: String multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False
epApplicationRef	This parameter specifies a list of application level EPs (i.e. EP_N3 or EP_NgU or EP_F1U) associated with the logical transport interface.	type: DN multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False

epTransportRef	This parameter specifies a list of transport level EPs associated with the application level EP (i.e. EP_N3 or EP_NgU) or network slice subnet.	type: DN multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: True
sliceSimultaneousUse	This attribute describes whether a network slice can be simultaneously used by a device together with other network slices and if so, with which other classes of network slices. allowedValues: “0”, “1”, “2”, “3”, “4”. “0”: Can be used with any network slice “1”: Can be used with network slices with same SST value “2”: Can be used with any network slice with same SD value “3”: Cannot be used with another network slice “4”: Cannot be used by a UE in a specific location	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
energyEfficiency	An attribute which describes the energy efficiency of a network slice, i.e. the ratio between the performance of a network slice and its energy consumption (EC) when assessed during the same time frame, see clause 3.4.7 of NG.116 [50].	type: EnergyEfficiency multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
EnergyEfficiency.performance	Depending on the sST value, EnergyEfficiency.performance will be - eMBBEEPerfReq or - uRLLCEEPerfReq or - mIoTEEPerfReq allowedValues: - eMBBEEPerfReq identifies the requirement in terms of energy efficiency, i.e. the performance per consumed Joule in type Real, where performance can take one of the following forms (type: ENUM): - number of bits (Integer) (see TS 28.554 [27] clause 6.7.2.2). - number of bits (Integer) for RAN-based network slice (see TS 28.554 [27] clause 6.7.2.2a). - uRLLCEEPerfReq identifies the requirement in terms of energy efficiency, i.e. the performance per consumed Joule in type Real, where performance can take one of the following forms (type: ENUM): - inverse of the latency in 0.1ms (Real) (see TS 28.554 [27] clause 6.7.2.3.2). - number of bits multiplied by the inverse of the latency in 0.1ms (Real) (see TS 28.554 [27] clause 6.7.2.3.3). - mIoTEEPerfReq identifies the requirement in terms of energy efficiency, i.e. the performance per consumed Joule in type Real, where performance can take one of the following forms (type: ENUM): - maximum number of registered subscribers (Integer) (see TS 28.554 [27] clause 6.7.2.4.1), - mean number of active UEs (Integer) (see TS 28.554 [27] clause 6.7.2.4.2). See NOTE 3.	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True

topSliceSubnetProfile.energyEfficiency	An attribute which describes the energy efficiency through all domains of the network slice, i.e. the ratio between the performance and the energy consumption (EC) when assessed during the same time frame, see clause 3.4.7 of NG.116 [50].	type: EnergyEfficiency multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
CNSliceSubnetProfile. energyEfficiency	An attribute which describes the energy efficiency through CN domain of the network slice, i.e. the ratio between the performance and the energy consumption (EC) when assessed during the same time frame, see clause 3.4.7 of NG.116 [50].	type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
RANSliceSubnetProfile. energyEfficiency	An attribute which describes the energy efficiency through RAN domain of the network slice, i.e. the ratio between the performance and the energy consumption (EC) when assessed during the same time frame, see clause 3.4.7 of NG.116 [50].	type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
nssaaSupport	An attribute specifies whether for the Network Slice, devices need to be also authenticated and authorized by a AAA server using additional credentials different than the ones used for the primary authentication, see clause 3.4.37 of NG.116 [50]. allowedValues: N/A	type: NSSAASupport multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
nssaaSupport.support	An attribute specifies whether or not the Network Slice, devices need to be also authenticated and authorized by a AAA server using additional credentials different than the ones used for the primary authentication. allowedValues: "NOT SUPPORTED", "SUPPORTED".	type: ENUM multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: False isNullable: False
ServiceProfile.n6Protection	An attribute which includes required security functions and corresponding rules of each function for network slice N6 interface protection. allowedValues: N/A	type: N6Protection multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
CNSliceSubnetProfile. n6Protection	An attribute which includes required security functions and corresponding rules of each function for network slice N6 interface protection. allowedValues: N/A	type: N6Protection multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
secFuncList	An attribute which holds the list of security control functions/features required by the Network Slice or Network Slice Subnet consumer. allowedValues: N/A	type: SecFunc multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: False
secFunId	An attribute which identifies a security function. allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
secFunType	An attribute which describes the type of the security function. E.g. Firewall, NAT, antimalware, parental control, DDoS protection function, etc. allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
secRules	An attribute which could be configured on each function. If it's absent, the default rules could be applied. allowedValues: N/A	type: String multiplicity: 0..* isOrdered: False isUnique: True defaultValue: None isNullable: False

networkSliceSubnetType	An attribute indicating type of network slice subnet, including: - Top network slice subnet - RAN network slice subnet - CN network slice subnet Allowed Value: TOP_SLICESUBNET,RAN_SLICESUBNET,CN_SLICESUBNET	type:Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
priorityLabel	An attribute specifies a label that consumer would assign a value on an instance of network slice subnet. The management system takes the value of this attribute into account. The effect of this attribute value to the subject managed entity is not standardized allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
NetworkSliceSubnetProviderCapabilities.dLlatency	This attribute specifies the achievable packet transmission latency in downlink (millisecond) through the network slice subnet.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
NetworkSliceSubnetProviderCapabilities.uLlatency	This attribute specifies the achievable packet transmission latency in uplink (millisecond) through the network slice subnet.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
NetworkSliceSubnetProviderCapabilities.dLThptPerSliceSubnet	This attribute defines achievable data rate of the network slice subnet in downlink that is available ubiquitously across the coverage area of the slice.	type: XLThpt multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
NetworkSliceSubnetProviderCapabilities.uLThptPerSliceSubnet	This attribute defines achievable data rate of the network slice subnet in uplink that is available ubiquitously across the coverage area of the slice.	type: XLThpt multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: False
NetworkSliceSubnetProviderCapabilities.coverageAreaTAList	An attribute specifies a list of Tracking Areas that a network slice subnet can serve. allowedValues: Legacy TAC and Extended TAC are defined in clause 9.3.3.10 of TS 38.413 [5].	type: Integer multiplicity: 1..* isOrdered: FalseN/A isUnique: N/ATrue defaultValue: None allowedValues: N/A isNullable: False
processMonitor	An attribute describes the process monitoring information of the feasibility check job. See correddponding processMonitor definition in TS 28.622[30].	type: ProcessMonitor multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
feasibilityResult	An attribute which specifies the feasibility check result for the feasibility check job. This attribute is configured by MnS producer and can be read by MnS consumer. The feasibilityResult is configured once the "status" is "FINISHED" Allowed Value: FEASIBLE: which means the specified network slicing related requirements (i.e. ServiceProfile, SliceProfile) can be satisfied by the MnS producer. InFEASIBLE: which means the specified network slicing related requirements (i.e. ServiceProfile, SliceProfile) cannot be satisfied by the MnS producer.	type: Enum multiplicity: 0..1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

inFeasibleReason	An attribute that specifies the additional reason information if the feasibility check result is infeasible. This attribute can be absent if the feasibility check result is feasibile. Allowed Value: the detailed content (Enum Value) for the inFeasibleReason is not defined in the present document.	type: Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: True
resourceReservation	An attribute represents MnS consumer's requirements for resource reservation. Allowed Value: TRUE: MnS producer need to reserve corresponding resources FALSE (DeaultValue): no guarantee for the corresponding resources.	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: False
requestedReservationExpiration	An attribute which specifes MnS consumer's requirememts for the validity period of the resource reservation. The value of requestedReservationExpiration is specified by MnS consumer.	type: Timestamp multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: False
reservationExpiration	An attribute which specifes the actual validity period of the resource reservation. After the period expires, no guarantees are given for the resources associated to the corresponding network slicing related requirements (i.e. ServiceProfile, SliceProfile). which is specified by MnS producer based on requested reservation expiration from MnS consumer and its own reservation capabilities. In case MnS produer have the enpugh capability to satisfy MnS consumer's reservation requirememts, the value of reservationExpiration is same as requestedReservationExpiration.	type: Timestamp multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: False
resourceReservationStatus	An attribute which specifies the resource reservation result for the feasibility check job. This attribute is configured by MnS producer and can be read by MnS consumer. Allowed Value: RESERVED: which means the resources for the specified network slicing related requirements (i.e. ServiceProfile, SliceProfile) is reserved. UNRESERVED: which means the resources for the specified network slicing related requirements (i.e. ServiceProfile, SliceProfile) is not reserved. USED: which means the reserved resource for the specified network slicing related requirements is used.	type: Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: False
recommendedRequirements	An attribute which specifies the recommended network slicing related requirements (i.e. ServiceProfile and SliceProfile information) which can be supported by the MnS producer.This information is provided when the feasibility check result is infeasible. This information can be used by MnS consumer to adjust the network slicing related requirements.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: False
reservationFailureReason	An attribute that specifies the additional reason information if the reservation is failed. This attribute can be absent if the reservation is successful. Allowed Value: the detailed content (Enum Value) for the reservationFailureReason is not defined in the present document.	type: Enum multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None allowedValues: N/A isNullable: True

NOTE 1: There is no direct relationship between localAddress/remoteAddress in EP_RP and ipAddress in EP_transport. While the localAddress/remoteAddress in EP_RP could be exchanged as part of signalling between GTP-u tunnel end points, ipAddress in EP_transport is used for transport routing.

NOTE 2: void

NOTE 3: energy efficiency requirement for V2X is not part of the current document.

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	S	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	S	Notes
notifyMOICreation	O	--
notifyMOIDeletion	O	--
notifyMOIAttributeValueChanges	O	--
notifyMOIChanges	O	--
notifyEvent	O	--

6.5.3 Threshold Crossing 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	S	Notes
notifyThresholdCrossing	M	
notifyThresholdCrossing	M	
notifyThresholdCrossing	M	

7 Solution Set (SS)

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

- YAML 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:

- YAML 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:

- YAML based 3GPP Network Slice NRM Solution Set (Annex J).
- YANG based 3GPP Network Slice NRM Solution Set (Annex O)

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 clause 8.5 of TS 38.401 [4]. See below an extract from clause 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.

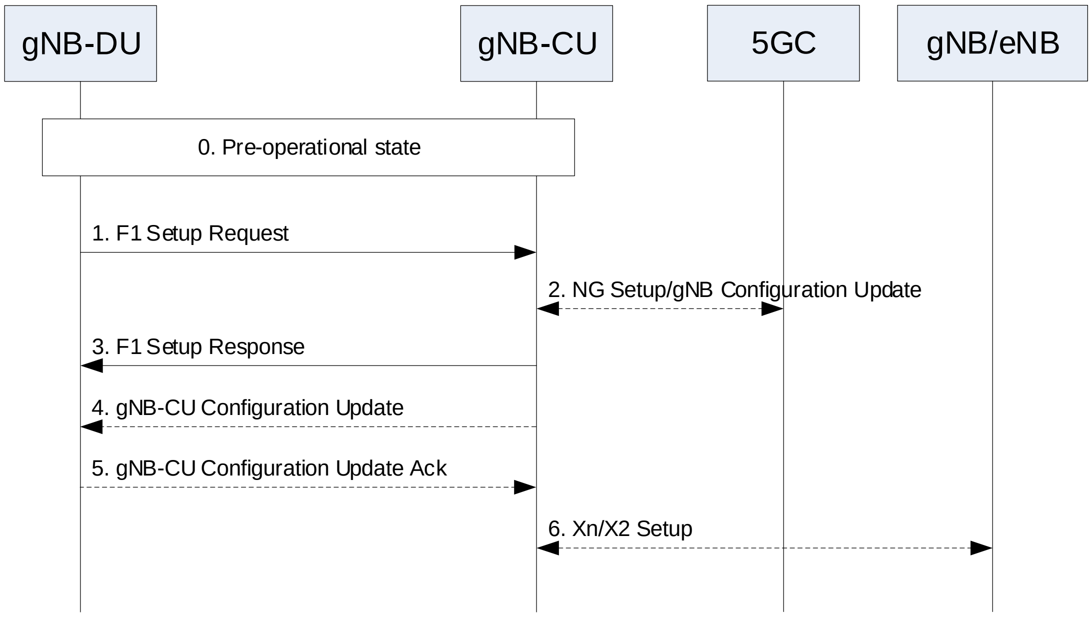


Figure 8.5-1: F1 startup and cell activation

A.2 Combined state diagram for gNB cell

This is the Combined state diagram for gNB cell.

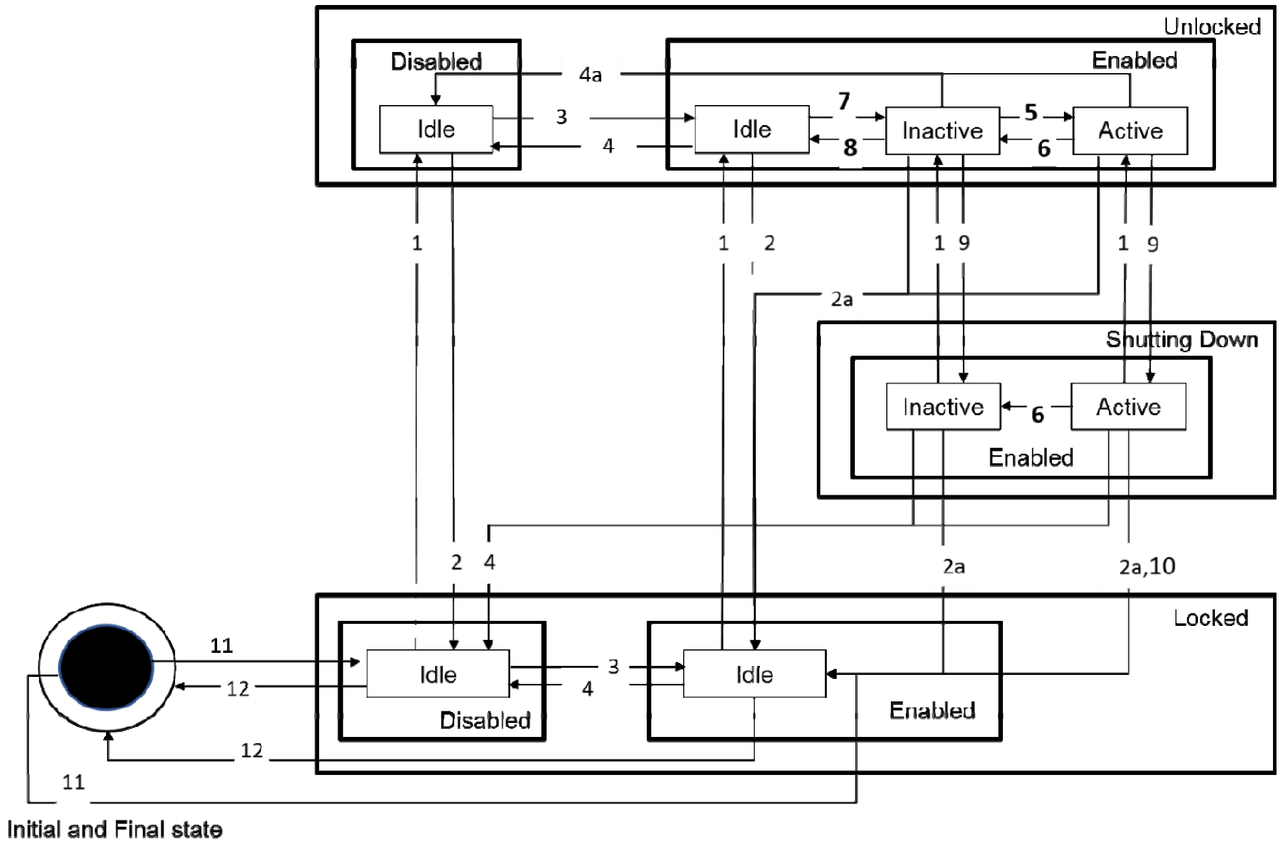


Figure A.2-1: Combined gNB cell state diagram

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

A NetworkSlice instance (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 and operational state of systems in general.

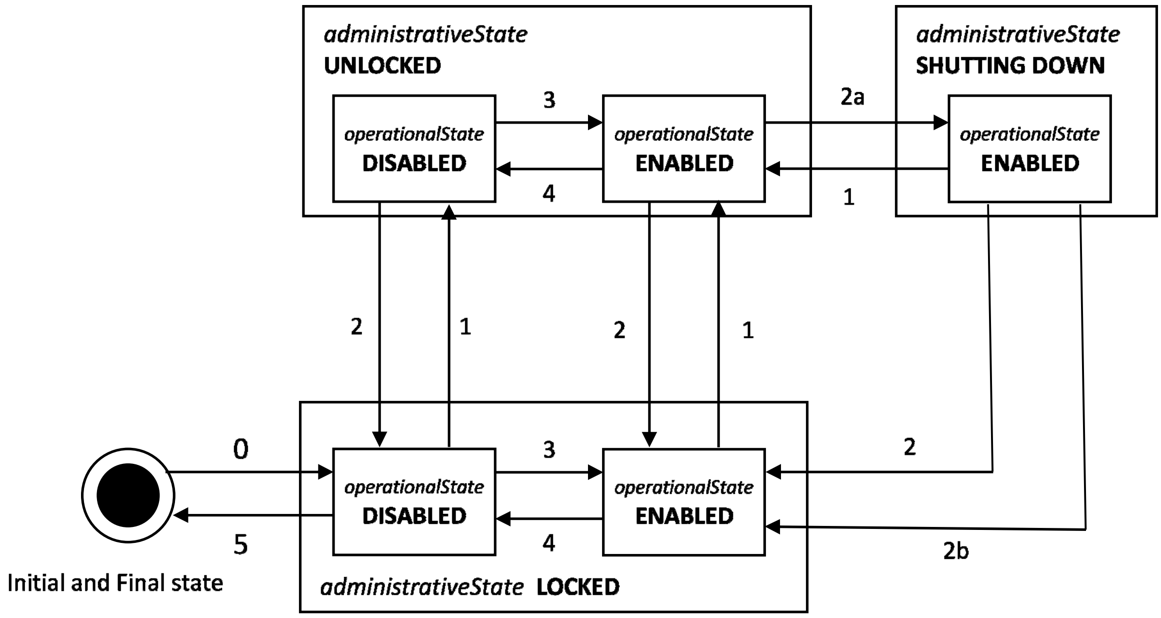


Figure B.1: Combined NSI state diagram

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.

Table B.1: The NSI state transition table

Trigger number	The state transition events and actions
0	Operation allocateNsi results in the creation of NSI. The administrative state is set to LOCKED and operationalState is set to DISABLED -- or – CM operation creates NSI. The administrative state is set to LOCKED and operationalState is set to DISABLED
1	CM operation sets administrative state to UNLOCKED.
2	The last user of the NSI stops using the NSI
2a	CM operation sets administrative state to SHUTTING DOWN
2b	The last user of the NSInetwork slice stops using the NSInetwork slice
3	The related NSSI (identified by `NetworkSlice.networkSliceSubnetRef`) changes state to UNLOCKED and ENABLED.
4	The related NSSI (identified by `NetworkSlice.networkSliceSubnetRef`) changes state to LOCKED -- or – The related NSSI (identified by `NetworkSlice.networkSliceSubnetRef`) changes state to DISABLED
5	Operation deallocateNsi results in the deletion of NSI -- or – CM operation deletes NSI

B.2 State handling of NSSI

A NetworkSliceSubnet instance (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 and operational state of systems in general.

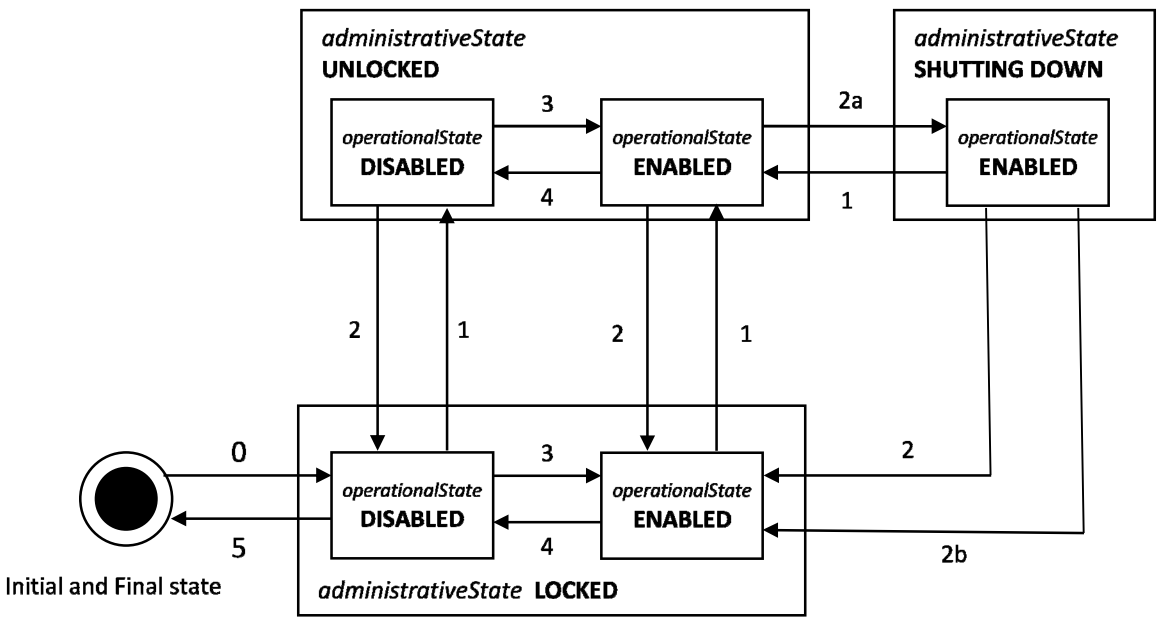


Figure B.2.1: Combined NSSI state diagram

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.

Table B.2.1: The NSSI state transition table

Trigger number	The state transition events and actions
0	Operation allocateNssi results in the creation of NSSI. The administrative state is set to LOCKED and operationalState is set to DISABLED -- or – CM operation creates NSSI. The administrative state is set to LOCKED and operationalState is set to DISABLED
1	CM operation sets administrative state to UNLOCKED.
2	CM operation sets administrative state to LOCKED
2a	CM operation sets administrative state to SHUTTING DOWN
2b	The last user of the NSSInetwork slice subnet stops using the NSSInetwork slice subnet
3	All constituent NSSIs (identified by `NetworkSliceSubnet.networkSliceSubnetRef`) change state to UNLOCKED and ENABLED.
4	At least one constituent NSSI (identified by `NetworkSliceSubnet.networkSliceSubnetRef`) changes state to LOCKED -- or – At least one constituent NSSI (identified by `NetworkSliceSubnet.networkSliceSubnetRef`) changes state to DISABLED
5	Operation deallocateNssi results in the deletion of NSSI -- or – CM operation deletes NSSI.

Annex C (normative): Void

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 TS 32.160 [47].

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 "TS28541_NrNrm.yaml"

```yaml
openapi: 3.0.1
info:
  title: NR NRM
  version: 17.7.0
  description: >-
    OAS 3.0.1 specification of the NR NRM
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externalDocs:
  description: 3GPP TS 28.541; 5G NRM, NR NRM
  url: http://www.3gpp.org/ftp/Specs/archive/28_series/28.541/
paths: {}
components:
  schemas:

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

    GnbId:
      type: string
    GnbIdLength:
      type: integer
      minimum: 22
      maximum: 32
    GnbName:
```

```
      type: string
      maxLength: 150
    GnbDuId:
      type: number
      minimum: 0
      maximum: 68719476735
    GnbCuUpId:
      type: number
      minimum: 0
      maximum: 68719476735

    Sst:
      type: integer
      maximum: 255
    Snssai:
      type: object
      properties:
        sst:
          $ref: '#/components/schemas/Sst'
        sd:
          type: string

    Mnc:
      type: string
      pattern: '[0-9]{3}|[0-9]{2}'
    PlmnId:
      type: object
      properties:
        mcc:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Mcc'
        mnc:
          $ref: '#/components/schemas/Mnc'
    PlmnIdList:
      type: array
      items:
        $ref: '#/components/schemas/PlmnId'
    PlmnInfo:
      type: object
      properties:
        plmnId:
          $ref: '#/components/schemas/PlmnId'
        snssai:
          $ref: '#/components/schemas/Snssai'
    PlmnInfoList:
      type: array
      items:
        $ref: '#/components/schemas/PlmnInfo'
    cagId:
      type: string
    nid:
      type: string
    NpnIdentity:
      type: object
      properties:
        plmnId:
          $ref: '#/components/schemas/PlmnId'
        cagidList:
          $ref: '#/components/schemas/cagId'
        nidList:
          $ref: '#/components/schemas/nid'
    NpnIdentityList:
      type: array
      items:
        $ref: '#/components/schemas/NpnIdentity'
    GGnbId:
        type: string
        pattern: '^[0-9]{3}[0-9]{2,3}-(22|23|24|25|26|27|28|29|30|31|32)-[0-9]{1,10}'
    GEnbId:
        type: string
        pattern: '^[0-9]{3}[0-9]{2,3}-(18|20|21|22)-[0-9]{1,7}'

    GGnbIdList:
        type: array
        items:
          $ref: '#/components/schemas/GGnbId'

    GEnbIdList:
        type: array
```

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

    NrPci:
      type: integer
      maximum: 503
    NrTac:
      type: integer
      maximum: 16777215
    NrTacList:
      type: array
      items:
        $ref: '#/components/schemas/NrTac'
    Tai:
      type: object
      properties:
        plmnId:
          $ref: '#/components/schemas/PlmnId'
        nrTac:
          $ref: '#/components/schemas/NrTac'
    TaiList:
      type: array
      items:
        $ref: '#/components/schemas/Tai'
    BackhaulAddress:
      type: object
      properties:
        gnbId:
          $ref: '#/components/schemas/GnbId'
        tai:
          $ref: "#/components/schemas/Tai"
    MappingSetIDBackhaulAddress:
      type: object
      properties:
        setID:
          type: integer
        backhaulAddress:
          $ref: '#/components/schemas/BackhaulAddress'
    IntraRatEsActivationOriginalCellLoadParameters:
      type: object
      properties:
        loadThreshold:
          type: integer
        timeDuration:
          type: integer
    IntraRatEsActivationCandidateCellsLoadParameters:
      type: object
      properties:
        loadThreshold:
          type: integer
        timeDuration:
          type: integer
    IntraRatEsDeactivationCandidateCellsLoadParameters:
      type: object
      properties:
        loadThreshold:
          type: integer
        timeDuration:
          type: integer
    EsNotAllowedTimePeriod:
      type: object
      properties:
        startTimeandendTime:
          type: string
        periodOfDay:
          type: string
        daysOfWeekList:
          type: string
        listoftimeperiods:
          type: string
    InterRatEsActivationOriginalCellParameters:
      type: object
      properties:
        loadThreshold:
          type: integer
        timeDuration:
          type: integer
    InterRatEsActivationCandidateCellParameters:
```

```
      type: object
      properties:
        loadThreshold:
          type: integer
        timeDuration:
          type: integer
    InterRatEsDeactivationCandidateCellParameters:
      type: object
      properties:
        loadThreshold:
          type: integer
        timeDuration:
          type: integer

    UeAccProbilityDist:
      type: object
      properties:
        targetProbability:
          type: integer
        numberofpreamblessent:
          type: integer

    UeAccDelayProbilityDist:
      type: object
      properties:
        targetProbability:
          type: integer
        accessdelay:
          type: integer

    NRPciList:
      type: object
      properties:
        NRPci:
          type: integer

    CSonPciList:
      type: object
      properties:
        NRPci:
          type: integer

    MaximumDeviationHoTrigger:
      type: integer
      minimum: -20
      maximum: 20

    MaximumDeviationHoTriggerLow:
      type: integer
      minimum: -20
      maximum: 20

    MaximumDeviationHoTriggerHigh:
      type: integer
      minimum: -20
      maximum: 20

    MinimumTimeBetweenHoTriggerChange:
      type: integer
      minimum: 0
      maximum: 604800

    TstoreUEcntxt:
      type: integer
      minimum: 0
      maximum: 1023

    CellState:
      type: string
      enum:
        - IDLE
        - INACTIVE
        - ACTIVE
    CyclicPrefix:
      type: string
      enum:
        - '15'
        - '30'
```

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          - '60'
          - '120'
    TxDirection:
      type: string
      enum:
        - DL
        - UL
        - DL and UL
    BwpContext:
      type: string
      enum:
        - DL
        - UL
        - SUL
    IsInitialBwp:
      type: string
      enum:
        - INITIAL
        - OTHER
        - SUL

    IsESCoveredBy:
      type: string
      enum:
        - NO
        - PARTIAL
        - FULL
    RrmPolicyMember:
      type: object
      properties:
        plmnId:
          $ref: '#/components/schemas/PlmnId'
        snssai:
          $ref: '#/components/schemas/Snssai'
    RrmPolicyMemberList:
      type: array
      items:
        $ref: '#/components/schemas/RrmPolicyMember'
    AddressWithVlan:
      type: object
      properties:
        ipv4Address:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Ipv4Addr'
        ipv6Address:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Ipv6Addr'
        vlanId:
          type: integer
          minimum: 0
          maximum: 4096
    LocalAddress:
      type: object
      properties:
        addressWithVlan:
          $ref: '#/components/schemas/AddressWithVlan'
        port:
          type: integer
          minimum: 0
          maximum: 65535
    RemoteAddress:
      type: object
      properties:
        ipv4Address:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Ipv4Addr'
        ipv6Address:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Ipv6Addr'

    CellIndividualOffset:
      type: object
      properties:
        rsrpOffsetSSB:
          type: integer
        rsrqOffsetSSB:
          type: integer
        sinrOffsetSSB:
          type: integer
        rsrpOffsetCSI-RS:
          type: integer
        rsrqOffsetCSI-RS:
```

```
          type: integer
        sinrOffsetCSI-RS:
          type: integer
    QOffsetRange:
      type: integer
      enum:
        - -24
        - -22
        - -20
        - -18
        - -16
        - -14
        - -12
        - -10
        - -8
        - -6
        - -5
        - -4
        - -3
        - -2
        - -1
        - 0
        - 24
        - 22
        - 20
        - 18
        - 16
        - 14
        - 12
        - 10
        - 8
        - 6
        - 5
        - 4
        - 3
        - 2
        - 1
    QOffsetRangeList:
      type: object
      properties:
        rsrpOffsetSSB:
          $ref: '#/components/schemas/QOffsetRange'
        rsrqOffsetSSB:
          $ref: '#/components/schemas/QOffsetRange'
        sinrOffsetSSB:
          $ref: '#/components/schemas/QOffsetRange'
        rsrpOffsetCSI-RS:
          $ref: '#/components/schemas/QOffsetRange'
        rsrqOffsetCSI-RS:
          $ref: '#/components/schemas/QOffsetRange'
        sinrOffsetCSI-RS:
          $ref: '#/components/schemas/QOffsetRange'
    QOffsetFreq:
      type: number
    TReselectionNRSf:
      type: integer
      enum:
        - 25
        - 50
        - 75
        - 100
    SsbPeriodicity:
      type: integer
      enum:
        - 5
        - 10
        - 20
        - 40
        - 80
        - 160
    SsbDuration:
      type: integer
      enum:
        - 1
        - 2
        - 3
        - 4
        - 5
```

```
    SsbSubCarrierSpacing:
      type: integer
      enum:
        - 15
        - 30
        - 120
        - 240
    CoverageShape:
      type: integer
      maximum: 65535
    DigitalTilt:
      type: integer
      minimum: -900
      maximum: 900
    DigitalAzimuth:
      type: integer
      minimum: -1800
      maximum: 1800

    RSSetId:
      type: integer
      maximum: 4194303

    RSSetType:
      type: string
      enum:
        - RS1
        - RS2

    FrequencyDomainPara:
      type: object
      properties:
        rimRSSubcarrierSpacing:
          type: integer
        rIMRSBandwidth:
         type: integer
        nrofGlobalRIMRSFrequencyCandidates:
          type: integer
        rimRSCommonCarrierReferencePoint:
         type: integer
        rimRSStartingFrequencyOffsetIdList:
          type: array
          items:
            type: integer

    SequenceDomainPara:
      type: object
      properties:
        nrofRIMRSSequenceCandidatesofRS1:
         type: integer
        rimRSScrambleIdListofRS1:
          type: array
          items:
            type: integer
        nrofRIMRSSequenceCandidatesofRS2:
         type: integer
        rimRSScrambleIdListofRS2:
          type: array
          items:
            type: integer
        enableEnoughNotEnoughIndication:
          type: string
          enum:
            - ENABLE
            - DISABLE
        RIMRSScrambleTimerMultiplier:
          type: integer
        RIMRSScrambleTimerOffset:
          type: integer

    TimeDomainPara:
      type: object
      properties:
        dlULSwitchingPeriod1:
          type: string
          enum:
           - MS0P5
           - MS0P625
```

```
           - MS1
           - MS1P25
           - MS2
           - MS2P5
           - MS3
           - MS4
           - MS5
           - MS10
           - MS20
        symbolOffsetOfReferencePoint1:
           type: integer
        dlULSwitchingPeriod2:
          type: string
          enum:
           - MS0P5
           - MS0P625
           - MS1
           - MS1P25
           - MS2
           - MS2P5
           - MS3
           - MS4
           - MS5
           - MS10
           - MS20
        symbolOffsetOfReferencePoint2:
          type: integer
        totalnrofSetIdofRS1:
          type: integer
        totalnrofSetIdofRS2:
          type: integer
        nrofConsecutiveRIMRS1:
          type: integer
        nrofConsecutiveRIMRS2:
          type: integer
        consecutiveRIMRS1List:
          type: array
          items:
            type: integer
        consecutiveRIMRS2List:
          type: array
          items:
            type: integer
        enablenearfarIndicationRS1:
          type: string
          enum:
            - ENABLE
            - DISABLE
        enablenearfarIndicationRS2:
          type: string
          enum:
            - ENABLE
            - DISABLE

    RimRSReportInfo:
      type: object
      properties:
        detectedSetID:
          type: integer
        propagationDelay:
          type: integer
        functionalityOfRIMRS:
          type: string
          enum:
            - RS1
            - RS2
            - RS1forEnoughMitigation
            - RS1forNotEnoughMitigation

    RimRSReportConf:
      type: object
      properties:
        reportIndicator:
          type: string
          enum:
            - ENABLE
            - DISABLE
        reportInterval:
```

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          type: integer
        nrofRIMRSReportInfo:
          type: integer
        maxPropagationDelay:
          type: integer
        rimRSReportInfoList:
          type: array
          items:
            $ref: '#/components/schemas/RimRSReportInfo'
    TceMappingInfo:
      type: object
      properties:
        TceIPAddress:
          oneOf:
            - $ref: 'TS28623_ComDefs.yaml#/components/schemas/Ipv4Addr'
            - $ref: 'TS28623_ComDefs.yaml#/components/schemas/Ipv6Addr'
        TceID:
          type: integer
        PlmnTarget:
          $ref: '#/components/schemas/PlmnId'
    TceMappingInfoList:
      type: array
      items:
        $ref: '#/components/schemas/TceMappingInfo'
    ResourceType:
      type: string
      enum:
        - PRB
        - PRB_UL
        - PRB_DL
        - RRC
        - DRB
    ParameterRange:
      type: object
      properties:
          maxValue:
            type: integer
          minValue:
            type: integer
#-------- Definition of abstract IOCs --------------------------------------------

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


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

    MnS:
      oneOf:
        - type: object
          properties:
            SubNetwork:
              $ref: '#/components/schemas/SubNetwork-Multiple'
        - type: object
          properties:
            ManagedElement:
              $ref: '#/components/schemas/ManagedElement-Multiple'

    SubNetwork-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              $ref: 'TS28623_GenericNrm.yaml#/components/schemas/SubNetwork-Attr'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/SubNetwork-ncO'
        - type: object
          properties:
            SubNetwork:
              $ref: '#/components/schemas/SubNetwork-Multiple'
            ManagedElement:
              $ref: '#/components/schemas/ManagedElement-Multiple'
            NRFrequency:
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```
          $ref: '#/components/schemas/NRFrequency-Multiple'
        ExternalGnbCuCpFunction:
          $ref: '#/components/schemas/ExternalGnbCuCpFunction-Multiple'
        ExternalENBFunction:
          $ref: '#/components/schemas/ExternalENBFunction-Multiple'
        EUtranFrequency:
          $ref: '#/components/schemas/EUtranFrequency-Multiple'
        DESManagementFunction:
          $ref: '#/components/schemas/DESManagementFunction-Single'
        DRACHOptimizationFunction:
          $ref: '#/components/schemas/DRACHOptimizationFunction-Single'
        DMROFunction:
          $ref: '#/components/schemas/DMROFunction-Single'
        DLBOFunction:
          $ref: '#/components/schemas/DLBOFunction-Single'
        DPCIConfigurationFunction:
          $ref: '#/components/schemas/DPCIConfigurationFunction-Single'
        CPCIConfigurationFunction:
          $ref: '#/components/schemas/CPCIConfigurationFunction-Single'
        CESManagementFunction:
          $ref: '#/components/schemas/CESManagementFunction-Single'
        Configurable5QISet:
          $ref: 'TS28541_5GcNrm.yaml#/components/schemas/Configurable5QISet-Multiple'
        RimRSGlobal:
          $ref: '#/components/schemas/RimRSGlobal-Single'
        Dynamic5QISet:
          $ref: 'TS28541_5GcNrm.yaml#/components/schemas/Dynamic5QISet-Multiple'
        CCOFunction:
          $ref: '#/components/schemas/CCOFunction-Single'
ManagedElement-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedElement-Attr'
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedElement-ncO'
    - type: object
      properties:
        GnbDuFunction:
          $ref: '#/components/schemas/GnbDuFunction-Multiple'
        GnbCuUpFunction:
          $ref: '#/components/schemas/GnbCuUpFunction-Multiple'
        GnbCuCpFunction:
          $ref: '#/components/schemas/GnbCuCpFunction-Multiple'
        DESManagementFunction:
          $ref: '#/components/schemas/DESManagementFunction-Single'
        DRACHOptimizationFunction:
          $ref: '#/components/schemas/DRACHOptimizationFunction-Single'
        DMROFunction:
          $ref: '#/components/schemas/DMROFunction-Single'
        DLBOFunction:
          $ref: '#/components/schemas/DLBOFunction-Single'
        DPCIConfigurationFunction:
          $ref: '#/components/schemas/DPCIConfigurationFunction-Single'
        CPCIConfigurationFunction:
          $ref: '#/components/schemas/CPCIConfigurationFunction-Single'
        CESManagementFunction:
          $ref: '#/components/schemas/CESManagementFunction-Single'
        Configurable5QISet:
          $ref: 'TS28541_5GcNrm.yaml#/components/schemas/Configurable5QISet-Multiple'
        Dynamic5QISet:
          $ref: 'TS28541_5GcNrm.yaml#/components/schemas/Dynamic5QISet-Multiple'

GnbDuFunction-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                gnbDuId:
                  $ref: '#/components/schemas/GnbDuId'
                gnbDuName:
                  $ref: '#/components/schemas/GnbName'
```

```
                gnbId:
                  $ref: '#/components/schemas/GnbId'
                gnbIdLength:
                  $ref: '#/components/schemas/GnbIdLength'
                rimRSReportConf:
                  $ref: '#/components/schemas/RimRSReportConf'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            RRMPolicyRatio:
              $ref: '#/components/schemas/RRMPolicyRatio-Multiple'
            NrCellDu:
              $ref: '#/components/schemas/NrCellDu-Multiple'
            Bwp-Multiple:
              $ref: '#/components/schemas/Bwp-Multiple'
            NrSectorCarrier-Multiple:
              $ref: '#/components/schemas/NrSectorCarrier-Multiple'
            EP_F1C:
              $ref: '#/components/schemas/EP_F1C-Single'
            EP_F1U:
              $ref: '#/components/schemas/EP_F1U-Multiple'
            DRACHOptimizationFunction:
              $ref: '#/components/schemas/DRACHOptimizationFunction-Single'
            OperatorDU:
              $ref: '#/components/schemas/OperatorDu-Multiple'

    OperatorDu-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            gnbId:
              $ref: '#/components/schemas/GnbId'
            gnbIdLength:
              $ref: '#/components/schemas/GnbIdLength'
        - type: object
          properties:
            EP_F1C:
              $ref: '#/components/schemas/EP_F1C-Single'
            EP_F1U:
              $ref: '#/components/schemas/EP_F1U-Multiple'

    GnbCuUpFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    gnbId:
                      $ref: '#/components/schemas/GnbId'
                    gnbIdLength:
                      $ref: '#/components/schemas/GnbIdLength'
                    gnbCuUpId:
                      $ref: '#/components/schemas/GnbCuUpId'
                    plmnInfoList:
                      $ref: '#/components/schemas/PlmnInfoList'
                    configurable5QISetRef:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
                    dynamic5QISetRef:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            RRMPolicyRatio:
              $ref: '#/components/schemas/RRMPolicyRatio-Multiple'
            EP_E1:
              $ref: '#/components/schemas/EP_E1-Single'
            EP_XnU:
              $ref: '#/components/schemas/EP_XnU-Multiple'
            EP_F1U:
              $ref: '#/components/schemas/EP_F1U-Multiple'
            EP_NgU:
              $ref: '#/components/schemas/EP_NgU-Multiple'
            EP_X2U:
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```
          $ref: '#/components/schemas/EP_X2U-Multiple'
        EP_S1U:
          $ref: '#/components/schemas/EP_S1U-Multiple'
    GnbCuCpFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    gnbId:
                      $ref: '#/components/schemas/GnbId'
                    gnbIdLength:
                      $ref: '#/components/schemas/GnbIdLength'
                    gnbCuName:
                      $ref: '#/components/schemas/GnbName'
                    plmnId:
                      $ref: '#/components/schemas/PlmnId'
                    x2BlackList:
                      $ref: '#/components/schemas/GGnbIdList'
                    xnBlackList:
                      $ref: '#/components/schemas/GGnbIdList'
                    x2WhiteList:
                      $ref: '#/components/schemas/GGnbIdList'
                    xnWhiteList:
                      $ref: '#/components/schemas/GGnbIdList'
                    x2XnHOBlackList:
                      $ref: '#/components/schemas/GEnbIdList'
                    mappingSetIDBackhaulAddress:
                      $ref: '#/components/schemas/MappingSetIDBackhaulAddress'
                    tceMappingInfoList:
                      $ref: '#/components/schemas/TceMappingInfoList'
                    configurable5QISetRef:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
                    dynamic5QISetRef:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
                    dCHOControl:
                      type: boolean
                    dDAPSHOControl:
                      type: boolean
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            RRMPolicyRatio:
              $ref: '#/components/schemas/RRMPolicyRatio-Multiple'
            NrCellCu:
              $ref: '#/components/schemas/NrCellCu-Multiple'
            EP_XnC:
              $ref: '#/components/schemas/EP_XnC-Multiple'
            EP_E1:
              $ref: '#/components/schemas/EP_E1-Multiple'
            EP_F1C:
              $ref: '#/components/schemas/EP_F1C-Multiple'
            EP_NgC:
              $ref: '#/components/schemas/EP_NgC-Multiple'
            EP_X2C:
              $ref: '#/components/schemas/EP_X2C-Multiple'
            DANRManagementFunction:
              $ref: '#/components/schemas/DANRManagementFunction-Single'
            DESManagementFunction:
              $ref: '#/components/schemas/DESManagementFunction-Single'
            DMROFunction:
              $ref: '#/components/schemas/DMROFunction-Single'
            DLBOFunction:
              $ref: '#/components/schemas/DLBOFunction-Single'

    NrCellCu-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
```

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                properties:
                  cellLocalId:
                    type: integer
                  plmnInfoList:
                    $ref: '#/components/schemas/PlmnInfoList'
                  nRFrequencyRef:
                    $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            RRMPolicyRatio:
              $ref: '#/components/schemas/RRMPolicyRatio-Multiple'
            NRCellRelation:
              $ref: '#/components/schemas/NRCellRelation-Multiple'
            EUtranCellRelation:
              $ref: '#/components/schemas/EUtranCellRelation-Multiple'
            NRFreqRelation:
              $ref: '#/components/schemas/NRFreqRelation-Multiple'
            EUtranFreqRelation:
              $ref: '#/components/schemas/EUtranFreqRelation-Multiple'
            DESManagementFunction:
              $ref: '#/components/schemas/DESManagementFunction-Single'
            DMROFunction:
              $ref: '#/components/schemas/DMROFunction-Single'
            DLBOFunction:
              $ref: '#/components/schemas/DLBOFunction-Single'
            CESManagementFunction:
              $ref: '#/components/schemas/CESManagementFunction-Single'
            DPCIConfigurationFunction:
              $ref: '#/components/schemas/DPCIConfigurationFunction-Single'

    NrCellDu-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    administrativeState:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/AdministrativeState'
                    operationalState:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/OperationalState'
                    cellLocalId:
                      type: integer
                    cellState:
                      $ref: '#/components/schemas/CellState'
                    plmnInfoList:
                      $ref: '#/components/schemas/PlmnInfoList'
                    npnIdentityList:
                      $ref: '#/components/schemas/NpnIdentityList'
                    nrPci:
                      $ref: '#/components/schemas/NrPci'
                    nrTac:
                      $ref: '#/components/schemas/NrTac'
                    arfcnDL:
                      type: integer
                    arfcnUL:
                      type: integer
                    arfcnSUL:
                      type: integer
                    bSChannelBwDL:
                      type: integer
                    bSChannelBwUL:
                      type: integer
                    bSChannelBwSUL:
                      type: integer
                    ssbFrequency:
                      type: integer
                      minimum: 0
                      maximum: 3279165
                    ssbPeriodicity:
                      $ref: '#/components/schemas/SsbPeriodicity'
                    ssbSubCarrierSpacing:
                      $ref: '#/components/schemas/SsbSubCarrierSpacing'
                    ssbOffset:
```

```
                type: integer
                minimum: 0
                maximum: 159
              ssbDuration:
                $ref: '#/components/schemas/SsbDuration'
              nrSectorCarrierRef:
                type: array
                items:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
              bwpRef:
                type: array
                items:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
              rimRSMonitoringStartTime:
                type: string
              rimRSMonitoringStopTime:
                type: string
              rimRSMonitoringWindowDuration:
                type: integer
              rimRSMonitoringWindowStartingOffset:
                type: integer
              rimRSMonitoringWindowPeriodicity:
                type: integer
              rimRSMonitoringOccasionInterval:
                type: integer
              rimRSMonitoringOccasionStartingOffset:
                type: integer
              nRFrequencyRef:
                $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
              victimSetRef:
                $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
              aggressorSetRef:
                $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
      - type: object
        properties:
          RRMPolicyRatio:
            $ref: '#/components/schemas/RRMPolicyRatio-Multiple'
          CPCIConfigurationFunction:
            $ref: '#/components/schemas/CPCIConfigurationFunction-Single'
          DRACHOptimizationFunction:
            $ref: '#/components/schemas/DRACHOptimizationFunction-Single'
          NrOperatorCellDu:
            $ref: '#/components/schemas/NrOperatorCellDu-Multiple'

  NrOperatorCellDu-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          cellLocalId:
            type: integer
          administrativeState:
            $ref: 'TS28623_ComDefs.yaml#/components/schemas/AdministrativeState'
          plmnInfoList:
            $ref: '#/components/schemas/PlmnInfoList'
          nrTac:
            $ref: '#/components/schemas/NrTac'

  NRFrequency-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
              type: object
              properties:
                absoluteFrequencySSB:
                  type: integer
                  minimum: 0
                  maximum: 3279165
                ssbSubCarrierSpacing:
                  $ref: '#/components/schemas/SsbSubCarrierSpacing'
                multiFrequencyBandListNR:
                  type: integer
                  minimum: 1
                  maximum: 256
  EUtranFrequency-Single:
```

```yaml
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              type: object
              properties:
                earfcnDL:
                  type: integer
                  minimum: 0
                  maximum: 262143
                multiBandInfoListEutra:
                  type: integer
                  minimum: 1
                  maximum: 256

    NrSectorCarrier-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    txDirection:
                      $ref: '#/components/schemas/TxDirection'
                    configuredMaxTxPower:
                      type: integer
                    arfcnDL:
                      type: integer
                    arfcnUL:
                      type: integer
                    bSChannelBwDL:
                      type: integer
                    bSChannelBwUL:
                      type: integer
                    sectorEquipmentFunctionRef:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            CommonBeamformingFunction:
              $ref: '#/components/schemas/CommonBeamformingFunction-Single'
    Bwp-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    bwpContext:
                      $ref: '#/components/schemas/BwpContext'
                    isInitialBwp:
                      $ref: '#/components/schemas/IsInitialBwp'
                    subCarrierSpacing:
                      type: integer
                    cyclicPrefix:
                      $ref: '#/components/schemas/CyclicPrefix'
                    startRB:
                      type: integer
                    numberOfRBs:
                      type: integer
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    CommonBeamformingFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    coverageShape:
```

```
                  $ref: '#/components/schemas/CoverageShape'
                digitalAzimuth:
                  $ref: '#/components/schemas/DigitalAzimuth'
                digitalTilt:
                  $ref: '#/components/schemas/DigitalTilt'
      - type: object
        properties:
          Beam:
            $ref: '#/components/schemas/Beam-Multiple'
    Beam-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    beamIndex:
                      type: integer
                    beamType:
                      type: string
                      enum:
                        - SSB-BEAM
                    beamAzimuth:
                      type: integer
                      minimum: -1800
                      maximum: 1800
                    beamTilt:
                      type: integer
                      minimum: -900
                      maximum: 900
                    beamHorizWidth:
                      type: integer
                      minimum: 0
                      maximum: 3599
                    beamVertWidth:
                      type: integer
                      minimum: 0
                      maximum: 1800
    RRMPolicyRatio-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: '#/components/schemas/RrmPolicy_-Attr'
                - type: object
                  properties:
                    rRMPolicyMaxRatio:
                      type: integer
                    rRMPolicyMinRatio:
                      type: integer
                    rRMPolicyDedicatedRatio:
                      type: integer

    NRCellRelation-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
                  type: object
                  properties:
                    nRTCI:
                      type: integer
                    cellIndividualOffset:
                      $ref: '#/components/schemas/CellIndividualOffset'
                    adjacentNRCellRef:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
                    nRFreqRelationRef:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
                    isRemoveAllowed:
                      type: boolean
                    isHOAllowed:
                      type: boolean
                    isESCoveredBy:
```

```yaml
                  $ref: '#/components/schemas/IsESCoveredBy'
                isENDCAllowed:
                  type: boolean
                isMLBAllowed:
                  type: boolean
    EUtranCellRelation-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    adjacentEUtranCellRef:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    NRFreqRelation-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
                  type: object
                  properties:
                    offsetMO:
                      $ref: '#/components/schemas/QOffsetRangeList'
                    blockListEntry:
                      type: array
                      items:
                        type: integer
                        minimum: 0
                        maximum: 1007
                    blockListEntryIdleMode:
                      type: integer
                    cellReselectionPriority:
                      type: integer
                    cellReselectionSubPriority:
                      type: number
                      minimum: 0.2
                      maximum: 0.8
                      multipleOf: 0.2
                    pMax:
                      type: integer
                      minimum: -30
                      maximum: 33
                    qOffsetFreq:
                      $ref: '#/components/schemas/QOffsetFreq'
                    qQualMin:
                      type: number
                    qRxLevMin:
                      type: integer
                      minimum: -140
                      maximum: -44
                    threshXHighP:
                      type: integer
                      minimum: 0
                      maximum: 62
                    threshXHighQ:
                      type: integer
                      minimum: 0
                      maximum: 31
                    threshXLowP:
                      type: integer
                      minimum: 0
                      maximum: 62
                    threshXLowQ:
                      type: integer
                      minimum: 0
                      maximum: 31
                    tReselectionNr:
                      type: integer
                      minimum: 0
                      maximum: 7
                    tReselectionNRSfHigh:
                      $ref: '#/components/schemas/TReselectionNRSf'
                    tReselectionNRSfMedium:
```

```yaml
                  $ref: '#/components/schemas/TReselectionNRSf'
                nRFrequencyRef:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
    EUtranFreqRelation-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              type: object
              properties:
                cellIndividualOffset:
                  $ref: '#/components/schemas/CellIndividualOffset'
                blackListEntry:
                  type: array
                  items:
                    type: integer
                    minimum: 0
                    maximum: 1007
                blackListEntryIdleMode:
                  type: integer
                cellReselectionPriority:
                  type: integer
                cellReselectionSubPriority:
                  type: number
                  minimum: 0.2
                  maximum: 0.8
                  multipleOf: 0.2
                pMax:
                  type: integer
                  minimum: -30
                  maximum: 33
                qOffsetFreq:
                  $ref: '#/components/schemas/QOffsetFreq'
                qQualMin:
                  type: number
                qRxLevMin:
                  type: integer
                  minimum: -140
                  maximum: -44
                threshXHighP:
                  type: integer
                  minimum: 0
                  maximum: 62
                threshXHighQ:
                  type: integer
                  minimum: 0
                  maximum: 31
                threshXLowP:
                  type: integer
                  minimum: 0
                  maximum: 62
                threshXLowQ:
                  type: integer
                  minimum: 0
                  maximum: 31
                tReselectionEutran:
                  type: integer
                  minimum: 0
                  maximum: 7
                tReselectionNRSfHigh:
                  $ref: '#/components/schemas/TReselectionNRSf'
                tReselectionNRSfMedium:
                  $ref: '#/components/schemas/TReselectionNRSf'
                eUTranFrequencyRef:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
    DANRManagementFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
                  type: object
                  properties:
                    intrasystemANRManagementSwitch:
                      type: boolean
                    intersystemANRManagementSwitch:
                      type: boolean
```

```
    DESManagementFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
                  type: object
                  properties:
                    desSwitch:
                      type: boolean
                    intraRatEsActivationOriginalCellLoadParameters:
                      $ref: "#/components/schemas/IntraRatEsActivationOriginalCellLoadParameters"
                    intraRatEsActivationCandidateCellsLoadParameters:
                      $ref: "#/components/schemas/IntraRatEsActivationCandidateCellsLoadParameters"
                    intraRatEsDeactivationCandidateCellsLoadParameters:
                      $ref:
"#/components/schemas/IntraRatEsDeactivationCandidateCellsLoadParameters"
                    esNotAllowedTimePeriod:
                      $ref: "#/components/schemas/EsNotAllowedTimePeriod"
                    interRatEsActivationOriginalCellParameters:
                      $ref: "#/components/schemas/InterRatEsActivationOriginalCellParameters"
                    interRatEsActivationCandidateCellParameters:
                      $ref: "#/components/schemas/InterRatEsActivationCandidateCellParameters"
                    interRatEsDeactivationCandidateCellParameters:
                      $ref: "#/components/schemas/InterRatEsDeactivationCandidateCellParameters"
                    isProbingCapable:
                      type: string
                      enum:
                         - yes
                         - no
                    energySavingState:
                      type: string
                      enum:
                         - isNotEnergySaving
                         - isEnergySaving

    DRACHOptimizationFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
                  type: object
                  properties:
                    drachOptimizationControl:
                      type: boolean
                    ueAccProbilityDist:
                      $ref: "#/components/schemas/UeAccProbilityDist"
                    ueAccDelayProbilityDist:
                      $ref: "#/components/schemas/UeAccDelayProbilityDist"
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

    DMROFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
                  type: object
                  properties:
                    dmroControl:
                      type: boolean
                    maximumDeviationHoTriggerLow:
                      $ref: '#/components/schemas/MaximumDeviationHoTriggerLow'
                    maximumDeviationHoTriggerHigh:
                      $ref: '#/components/schemas/MaximumDeviationHoTriggerHigh'
                    minimumTimeBetweenHoTriggerChange:
                      $ref: '#/components/schemas/MinimumTimeBetweenHoTriggerChange'
                    tstoreUEcntxt:
                      $ref: '#/components/schemas/TstoreUEcntxt'
    DLBOFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
                  type: object
```

```
                  properties:
                    dlboControl:
                      type: boolean
                    maximumDeviationHoTrigger:
                          $ref: '#/components/schemas/MaximumDeviationHoTrigger'
                    minimumTimeBetweenHoTriggerChange:
                          $ref: '#/components/schemas/MinimumTimeBetweenHoTriggerChange'

    DPCIConfigurationFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
                  type: object
                  properties:
                    dPciConfigurationControl:
                      type: boolean
                    nRPciList:
                      $ref: "#/components/schemas/NRPciList"

    CPCIConfigurationFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
                  type: object
                  properties:
                    cPciConfigurationControl:
                      type: boolean
                    cSonPciList:
                      $ref: "#/components/schemas/CSonPciList"

    CESManagementFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
                  type: object
                  properties:
                    cesSwitch:
                      type: boolean
                    intraRatEsActivationOriginalCellLoadParameters:
                      $ref: "#/components/schemas/IntraRatEsActivationOriginalCellLoadParameters"
                    intraRatEsActivationCandidateCellsLoadParameters:
                      $ref: "#/components/schemas/IntraRatEsActivationCandidateCellsLoadParameters"
                    intraRatEsDeactivationCandidateCellsLoadParameters:
                      $ref:
"#/components/schemas/IntraRatEsDeactivationCandidateCellsLoadParameters"
                    esNotAllowedTimePeriod:
                      $ref: "#/components/schemas/EsNotAllowedTimePeriod"
                    interRatEsActivationOriginalCellParameters:
                      $ref: "#/components/schemas/IntraRatEsActivationOriginalCellLoadParameters"
                    interRatEsActivationCandidateCellParameters:
                      $ref: "#/components/schemas/IntraRatEsActivationOriginalCellLoadParameters"
                    interRatEsDeactivationCandidateCellParameters:
                      $ref: "#/components/schemas/IntraRatEsActivationOriginalCellLoadParameters"
                    energySavingControl:
                      type: string
                      enum:
                         - toBeEnergySaving
                         - toBeNotEnergySaving
                    energySavingState:
                      type: string
                      enum:
                         - isNotEnergySaving
                         - isEnergySaving

    RimRSGlobal-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              type: object
              properties:
```

```
            frequencyDomainPara:
              $ref: '#/components/schemas/FrequencyDomainPara'
            sequenceDomainPara:
              $ref: '#/components/schemas/SequenceDomainPara'
            timeDomainPara:
              $ref: '#/components/schemas/TimeDomainPara'
        RimRSSet:
          $ref: '#/components/schemas/RimRSSet-Multiple'

    RimRSSet-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              type: object
              properties:
                setId:
                  $ref: '#/components/schemas/RSSetId'
                setType:
                  $ref: '#/components/schemas/RSSetType'
                nRCellDURefs:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/DnList'

    ExternalGnbDuFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    gnbId:
                      $ref: '#/components/schemas/GnbId'
                    gnbIdLength:
                      $ref: '#/components/schemas/GnbIdLength'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            EP_F1C:
              $ref: '#/components/schemas/EP_F1C-Multiple'
            EP_F1U:
              $ref: '#/components/schemas/EP_F1U-Multiple'
    ExternalGnbCuUpFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    gnbId:
                      $ref: '#/components/schemas/GnbId'
                    gnbIdLength:
                      $ref: '#/components/schemas/GnbIdLength'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            EP_E1:
              $ref: '#/components/schemas/EP_E1-Multiple'
            EP_F1U:
              $ref: '#/components/schemas/EP_F1U-Multiple'
            EP_XnU:
              $ref: '#/components/schemas/EP_XnU-Multiple'
    ExternalGnbCuCpFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: >-
                    TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr
                - type: object
```

```
                  properties:
                    gnbId:
                      $ref: '#/components/schemas/GnbId'
                    gnbIdLength:
                      $ref: '#/components/schemas/GnbIdLength'
                    plmnId:
                      $ref: '#/components/schemas/PlmnId'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            ExternalNrCellCu:
              $ref: '#/components/schemas/ExternalNrCellCu-Multiple'
            EP_XnC:
              $ref: '#/components/schemas/EP_XnC-Multiple'
            EP_E1:
              $ref: '#/components/schemas/EP_E1-Multiple'
            EP_F1C:
              $ref: '#/components/schemas/EP_F1C-Multiple'
    ExternalNrCellCu-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    cellLocalId:
                      type: integer
                    nrPci:
                      $ref: '#/components/schemas/NrPci'
                    plmnIdList:
                      $ref: '#/components/schemas/PlmnIdList'
                    nRFrequencyRef:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    ExternalENBFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    eNBId:
                      type: integer
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            ExternalEUTranCell:
              $ref: '#/components/schemas/ExternalEUTranCell-Multiple'
    ExternalEUTranCell-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    EUtranFrequencyRef:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

    EP_XnC-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
```

```
                localAddress:
                  $ref: '#/components/schemas/LocalAddress'
                remoteAddress:
                  $ref: '#/components/schemas/RemoteAddress'
    EP_E1-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: '#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: '#/components/schemas/RemoteAddress'
    EP_F1C-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: '#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: '#/components/schemas/RemoteAddress'
    EP_NgC-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: '#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: '#/components/schemas/RemoteAddress'
    EP_X2C-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: '#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: '#/components/schemas/RemoteAddress'
    EP_XnU-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: '#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: '#/components/schemas/RemoteAddress'
    EP_F1U-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
```

```
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
            - type: object
              properties:
                localAddress:
                  $ref: '#/components/schemas/LocalAddress'
                remoteAddress:
                  $ref: '#/components/schemas/RemoteAddress'
                epTransportRefs:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/DnList'

  EP_NgU-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: '#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: '#/components/schemas/RemoteAddress'
                  epTransportRefs:
                    $ref: 'TS28623_ComDefs.yaml#/components/schemas/DnList'

  EP_X2U-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: '#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: '#/components/schemas/RemoteAddress'
  EP_S1U-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: '#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: '#/components/schemas/RemoteAddress'
  CCOFunction-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            type: object
            properties:
              cCOControl:
                type: boolean
              cCOWeakCoverageParameters:
                $ref: '#/components/schemas/CCOWeakCoverageParameters-Single'
              cCOPilotPollutionParameters:
                $ref: '#/components/schemas/CCOPilotPollutionParameters-Single'
              cCOOvershootCoverageParameters-Single:
                $ref: '#/components/schemas/CCOOvershootCoverageParameters-Single'
  CCOParameters-Attr:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
```

```
          properties:
            attributes:
              type: object
              properties:
                coverageShapeList:
                  type: integer
                downlinkTransmitPowerRange:
                  $ref: '#/components/schemas/ParameterRange'
                antennaTiltRange:
                  $ref: '#/components/schemas/ParameterRange'
                antennaAzimuthRange:
                  $ref: '#/components/schemas/ParameterRange'
                digitalTiltRange:
                  $ref: '#/components/schemas/ParameterRange'
                digitalAzimuthRange:
                  $ref: '#/components/schemas/ParameterRange'

    CCOWeakCoverageParameters-Single:
      allOf:
        - $ref: '#/components/schemas/CCOParameters-Attr'
        - type: object

    CCOPilotPollutionParameters-Single:
      allOf:
        - $ref: '#/components/schemas/CCOParameters-Attr'
        - type: object

    CCOOvershootCoverageParameters-Single:
      allOf:
        - $ref: '#/components/schemas/CCOParameters-Attr'
        - type: object

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

    SubNetwork-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/SubNetwork-Single'
    ManagedElement-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/ManagedElement-Single'
    GnbDuFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/GnbDuFunction-Single'
    OperatorDu-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/OperatorDu-Single'
    GnbCuUpFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/GnbCuUpFunction-Single'
    GnbCuCpFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/GnbCuCpFunction-Single'

    NrCellDu-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NrCellDu-Single'

    NrOperatorCellDu-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NrOperatorCellDu-Single'

    NrCellCu-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NrCellCu-Single'

    NRFrequency-Multiple:
      type: array
      minItems: 1
      items:
```

```
        $ref: '#/components/schemas/NRFrequency-Single'
    EUtranFrequency-Multiple:
      type: array
      minItems: 1
      items:
        $ref: '#/components/schemas/EUtranFrequency-Single'

    NrSectorCarrier-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NrSectorCarrier-Single'
    Bwp-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/Bwp-Single'
    Beam-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/Beam-Single'
    RRMPolicyRatio-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/RRMPolicyRatio-Single'

    NRCellRelation-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NRCellRelation-Single'
    EUtranCellRelation-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EUtranCellRelation-Single'
    NRFreqRelation-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NRFreqRelation-Single'
    EUtranFreqRelation-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EUtranFreqRelation-Single'

    RimRSSet-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/RimRSSet-Single'

    ExternalGnbDuFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/ExternalGnbDuFunction-Single'
    ExternalGnbCuUpFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/ExternalGnbCuUpFunction-Single'
    ExternalGnbCuCpFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/ExternalGnbCuCpFunction-Single'
    ExternalNrCellCu-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/ExternalNrCellCu-Single'

    ExternalENBFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/ExternalENBFunction-Single'
    ExternalEUTranCell-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/ExternalEUTranCell-Single'

    EP_E1-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_E1-Single'
    EP_XnC-Multiple:
      type: array
```

```
      items:
        $ref: '#/components/schemas/EP_XnC-Single'
    EP_F1C-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_F1C-Single'
    EP_NgC-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_NgC-Single'
    EP_X2C-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_X2C-Single'
    EP_XnU-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_XnU-Single'
    EP_F1U-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_F1U-Single'
    EP_NgU-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_NgU-Single'
    EP_X2U-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_X2U-Single'
    EP_S1U-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_S1U-Single'

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

    resources-nrNrm:
      oneOf:
        - $ref: '#/components/schemas/MnS'

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

        - $ref: '#/components/schemas/GnbDuFunction-Single'
        - $ref: '#/components/schemas/GnbCuUpFunction-Single'
        - $ref: '#/components/schemas/GnbCuCpFunction-Single'
        - $ref: '#/components/schemas/OperatorDu-Single'

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

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

        - $ref: '#/components/schemas/NrSectorCarrier-Single'
        - $ref: '#/components/schemas/Bwp-Single'
        - $ref: '#/components/schemas/CommonBeamformingFunction-Single'
        - $ref: '#/components/schemas/Beam-Single'
        - $ref: '#/components/schemas/RRMPolicyRatio-Single'

        - $ref: '#/components/schemas/NRCellRelation-Single'
        - $ref: '#/components/schemas/EUtranCellRelation-Single'
        - $ref: '#/components/schemas/NRFreqRelation-Single'
        - $ref: '#/components/schemas/EUtranFreqRelation-Single'

        - $ref: '#/components/schemas/DANRManagementFunction-Single'
        - $ref: '#/components/schemas/DESManagementFunction-Single'
        - $ref: '#/components/schemas/DRACHOptimizationFunction-Single'
        - $ref: '#/components/schemas/DMROFunction-Single'
        - $ref: '#/components/schemas/DLBOFunction-Single'
        - $ref: '#/components/schemas/DPCIConfigurationFunction-Single'
        - $ref: '#/components/schemas/CPCIConfigurationFunction-Single'
        - $ref: '#/components/schemas/CESManagementFunction-Single'

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

```
        - $ref: '#/components/schemas/ExternalGnbDuFunction-Single'
        - $ref: '#/components/schemas/ExternalGnbCuUpFunction-Single'
        - $ref: '#/components/schemas/ExternalGnbCuCpFunction-Single'
        - $ref: '#/components/schemas/ExternalNrCellCu-Single'
        - $ref: '#/components/schemas/ExternalENBFunction-Single'
        - $ref: '#/components/schemas/ExternalEUTranCell-Single'

        - $ref: '#/components/schemas/EP_XnC-Single'
        - $ref: '#/components/schemas/EP_E1-Single'
        - $ref: '#/components/schemas/EP_F1C-Single'
        - $ref: '#/components/schemas/EP_NgC-Single'
        - $ref: '#/components/schemas/EP_X2C-Single'
        - $ref: '#/components/schemas/EP_XnU-Single'
        - $ref: '#/components/schemas/EP_F1U-Single'
        - $ref: '#/components/schemas/EP_NgU-Single'
        - $ref: '#/components/schemas/EP_X2U-Single'
        - $ref: '#/components/schemas/EP_S1U-Single'
        - $ref: '#/components/schemas/CCOFunction-Single'
        - $ref: '#/components/schemas/CCOWeakCoverageParameters-Single'
        - $ref: '#/components/schemas/CCOPilotPollutionParameters-Single'
        - $ref: '#/components/schemas/CCOOvershootCoverageParameters-Single'
```

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.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-beam {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-nrnetwork-beam";
  prefix "beam3gpp";

  import _3gpp-nr-nrm-commonbeamformingfunction { prefix cbeamff3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }
  import _3gpp-nr-nrm-nrsectorcarrier { prefix nrsectcarr3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the Beam Information
    Object Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2019-11-22 {
    description "Initial revision";
    reference "S5-197643";
  }

  typedef BeamType {
    type enumeration {
      enum SSB-BEAM;
    }
  }

  grouping BeamGrp {
    description "Represents the Beam IOC.";
```

```
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf beamIndex {
      description "Index of the beam. ";
      mandatory true;
      type int32;
    }

    leaf beamType {
      description "The type of the beam. ";
      mandatory false;
      type BeamType;
    }

    leaf beamAzimuth {
      description "The azimuth of a beam transmission, which means the horizontal beamforming
pointing angle (beam peak direction) in the (Phi) φ-axis in 1/10th degree resolution.  The pointing
angle is the direction equal to the geometric centre of the half-power contour of the beam relative
to the reference plane. Zero degree implies explicit antenna bearing (boresight). Positive angle
implies clockwise from the antenna bearing.";
      reference "3GPP TS 38.104, TS 38.901, TS 28.662";
      mandatory false;
      type int32 { range "-1800..1800"; }
      units "0.1";
    }

    leaf beamTilt {
      description "The tilt of a beam transmission, which means the vertical beamforming pointing
angle (beam peak direction) in the (Theta) θ-axis in 1/10th degree resolution.
The pointing angle is the direction equal to the geometric centre of the half-power contour of the
beam relative to the reference plane. Positive value implies downtilt.";
      reference "3GPP TS 38.104, TS 38.901, TS 28.662";
      mandatory false;
      type int32 { range "-900..900"; }
      units "0.1";
    }



    leaf beamHorizWidth {
      description " The Horizontal beamWidth of a beam transmission, which means the horizontal
beamforming half-power (3dB down) beamwidth in the (Phi) φ-axis in 1/10th degree resolution.";
      reference "3GPP TS 38.104, TS 38.901";
      mandatory false;
      type int32 { range "0..3599"; }
      units "0.1";
    }

    leaf beamVertWidth {
      description " The Vertical beamWidth of a beam transmission, which means the vertical
beamforming half-power (3dB down) beamwidth in the (Theta) θ-axis in 1/10th degree resolution.";
      reference "3GPP TS 38.104, TS 38.901";
      mandatory false;
      type int32 { range "0..1800"; }
      units "0.1";
    }


  }

  augment
"/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction/nrsectcarr3gpp:NRSectorCarrier/cbeamff3gpp: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;
      }
    }
  }
```

```
}
<CODE ENDS>
```

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

```
module _3gpp-nr-nrm-bwp {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-bwp";
  prefix "bwp3gpp";

  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the BWP Information Object Class
    (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2020-11-17 { reference CR-0410 ; }
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 { reference "Initial revision"; }

  typedef CyclicPrefix {
    type enumeration {
      enum NORMAL;
      enum EXTENDED;
    }
  }

  typedef BwpContext {
    type enumeration {
      enum DL;
      enum UL;
      enum SUL;
    }
  }
  typedef IsInitialBwp {
    type enumeration {
      enum INITIAL;
      enum OTHER;
    }
  }

  grouping BWPGrp {
    description "Represents the BWP IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf bwpContext {
      description "Identifies whether the object is used for downlink, uplink
        or supplementary uplink.";
      mandatory true;
      type BwpContext;
    }

    leaf isInitialBwp {
      description "Identifies whether the object is used for initial or other
        BWP.";
      mandatory true;
      type IsInitialBwp;
    }

    leaf subCarrierSpacing {
      description "Subcarrier spacing configuration for a BWP.";
      reference "3GPP TS 38.104";
      mandatory true;
      type uint32 { range "15 | 30 | 60 | 120"; }
      units kHz;
    }
```

```
    leaf cyclicPrefix {
      description "Cyclic prefix, which may be normal or extended.";
      reference "3GPP TS 38.211";
      mandatory true;
      type CyclicPrefix;
    }

    leaf startRB {
      description "Offset in common resource blocks to common resource block 0
        for the applicable subcarrier spacing for a BWP.";
      reference "N_BWP_start in 3GPP TS 38.211";
      mandatory true;
      type uint32;
    }

    leaf numberOfRBs {
      description "Number of physical resource blocks for a BWP.";
      reference "N_BWP_size in 3GPP TS 38.211";
      mandatory true;
      type uint32;
    }
  }

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

    list BWP {
      description "Represents a bandwidth part (BWP).";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses BWPGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

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

```
module _3gpp-nr-nrm-commonbeamformingfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-nrnetwork-commonbeamformingfunction";
  prefix "combeamformfunc3gpp";

  import _3gpp-nr-nrm-nrsectorcarrier { prefix nrsectcarr3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }


  organization "3GPP SA5";
  description "Defines the YANG mapping of the CommonBeamformingFuntion Information
    Object Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2019-11-22 {
    description "Initial revision";
    reference "S5-197643";
  }

  grouping CommonBeamformingFunctionGrp {
    description "Represents the CommonBeamformingFunction IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf coverageShape {
      description "Identifies the sector carrier coverage shape described by the envelope of the
contained SSB beams. The coverage shape is implementation dependent.";
      mandatory true;
      type int32 { range "0..65535"; }
    }
```

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

      reference "3GPP TS 38.104, TS 38.901, TS 28.662";
      type int32 { range "-1800..1800"; }
      units "0.1";
    }

    leaf digitalTilt {
      description "Digitally-controlled tilt through beamforming. It represents the vertical
pointing direction of the antenna relative to the antenna bore sight, representing the total non-
mechanical vertical tilt of the selected coverageShape. Positive value gives downwards tilt and
negative value gives upwards tilt.";
      reference "3GPP TS 38.104, TS 38.901, TS 28.662";
      type int32 { range "-900..900"; }
      units "0.1";
    }
  }

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

    list CommonBeamformingFunction {
      description "Represents common beamforming functionality (eg: SSB beams) for the
NRSectorCarrier.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses CommonBeamformingFunctionGrp;
      }
    }
  }
}
```

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

```
<CODE BEGINS>
module _3gpp-nr-nrm-ep {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-ep";
  prefix "ep3gpp";

  import _3gpp-common-ep-rp { prefix eprp3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-nr-nrm-gnbcuupfunction { prefix gnbcuup3gpp; }
  import _3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the NR related endpoint
    Information Object Classes (IOCs) that are part of the NR Network
    Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";


  revision 2022-01-07 { reference CR-0643; }
  revision 2021-05-01 { reference CR-0490; }
  revision 2021-03-03 { reference CR-0435 ; }
  revision 2021-02-17 { reference CR-0470; }
  revision 2020-11-17 { reference CR-0410; }
  revision 2020-03-02 { reference S5-201191; }
  revision 2019-06-17 { reference "Initial revision"; }

  feature EPClassesUnderGNBCUCPFunction {
    description "Endpoint classes shall be contained under GNBCUCPFunction";
  }

  feature EPClassesUnderGNBCUUPFunction {
```

```
    description "Endpoint classes shall be contained under GNBCUUPFunction";
  }

  feature EPClassesUnderGNBDUFunction {
    description "Endpoint classes shall be contained under GNBDUFunction";
  }

  grouping EP_E1Grp {
    description "Represents the EP_E1 IOC.";
    reference "3GPP TS 28.541, 3GPP TS 38.401";
    uses eprp3gpp:EP_Common;
  }

  grouping EP_F1CGrp {
    description "Represents the EP_F1C IOC.";
    reference "3GPP TS 28.541, 3GPP TS 38.470";
    uses eprp3gpp:EP_Common;
  }

  grouping EP_F1UGrp {
    description "Represents the EP_F1U IOC.";
    reference "3GPP TS 28.541, 3GPP TS 38.470";
    uses eprp3gpp:EP_Common;
  }

  grouping EP_XnCGrp {
    description "Represents the EP_XnC IOC.";
    reference "3GPP TS 28.541, 3GPP TS 38.420";
    uses eprp3gpp:EP_Common;
  }

  grouping EP_XnUGrp {
    description "Represents the EP_XnU IOC.";
    reference "3GPP TS 28.541, 3GPP TS 38.420";
    uses eprp3gpp:EP_Common;
  }

  grouping EP_NgCGrp {
    description "Represents the EP_NgC IOC.";
    reference "3GPP TS 28.541, 3GPP TS 38.470";
    uses eprp3gpp:EP_Common;
  }

  grouping EP_NgUGrp {
    description "Represents the EP_NgU IOC.";
    reference "3GPP TS 28.541, 3GPP TS 38.470";
    uses eprp3gpp:EP_Common;
  }

  grouping EP_X2CGrp {
    description "Represents the EP_X2C IOC.";
    reference "3GPP TS 28.541, 3GPP TS 36.423";
    uses eprp3gpp:EP_Common;
  }

  grouping EP_X2UGrp {
    description "Represents the EP_X2U IOC.";
    reference "3GPP TS 28.541, 3GPP TS 36.425";
    uses eprp3gpp:EP_Common;
  }

  grouping EP_S1UGrp {
    description "Represents the EP_S1U IOC.";
    reference "3GPP TS 28.541, 3GPP TS 36.410";
    uses eprp3gpp:EP_Common;
  }

  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction" {
    if-feature EPClassesUnderGNBCUCPFunction;

    list EP_E1 {
      description "Represents the local end point of the logical link,
        supporting E1 interface between gNB-CU-CP and gNB-CU-UP.";
      reference "3GPP TS 28.541, 3GPP TS 38.401";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_E1Grp;
```

```
      }
    }

    list EP_F1C {
      description "Represents the local end point of the control plane
        interface (F1-C) between the gNB-DU and gNB-CU or gNB-CU-CP.";
      reference "3GPP TS 28.541, 3GPP TS 38.470";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_F1CGrp;
      }
    }

    list EP_NgC {
      description "Represents the local end point of the control plane
        interface (NG-C) between the gNB and AMF.";
      reference "3GPP TS 28.541, 3GPP TS 38.470";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_NgCGrp;
      }
    }

    list EP_XnC {
      description "Represents the local gNB node end point of the logical
        link, supporting Xn application protocols, to a neighbour NG-RAN node
        (including gNB and ng-eNB). The Xn Application PDUs are carried over
        SCTP/IP/Data link layer/Physical layer stack.";
      reference "3GPP TS 28.541, 3GPP TS 38.420 subclause 7";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_XnCGrp;
      }
    }

    list EP_X2C {
      description "Represents the local end point of the logical link,
        supporting X2-C application protocols used in EN-DC, to a neighbour
        eNB or en-gNB node.";
      reference "3GPP TS 28.541, 3GPP TS 36.423";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_X2CGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/gnbcuup3gpp:GNBCUUPFunction" {
    if-feature EPClassesUnderGNBCUUPFunction;

    list EP_E1 {
      description "Represents the local end point of the logical link,
        supporting E1 interface between gNB-CU-CP and gNB-CU-UP.";
      reference "3GPP TS 28.541, 3GPP TS 38.401";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_E1Grp;
      }
    }

    list EP_F1U {
      description "Represents the local end point of the user plane
        interface (F1-U) between the gNB-DU and gNB-CU or gNB-CU-UP.";
      reference "3GPP TS 28.541, 3GPP TS 38.470";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_F1UGrp;
      }
    }

    list EP_NgU {
      description "Represents the local end point of the NG user plane
```

```
        (NG-U) interface between the gNB and UPF.";
      reference "3GPP TS 28.541, 3GPP TS 38.470";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_NgUGrp;
      }
    }

    list EP_XnU {
      description "Represents the one end-point of a logical link supporting
        the Xn user plane (Xn-U) interface. The Xn-U interface provides
        non-guaranteed delivery of user plane PDUs between two NG-RAN nodes.";
      reference "3GPP TS 28.541, 3GPP TS 38.420";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_XnUGrp;
      }
    }

    list EP_X2U {
      description "Represents the local end-point of a logical link supporting
        the X2 user plane (X2-U) interface used in EN-DC.";
      reference "3GPP TS 28.541, 3GPP TS 36.425";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_X2UGrp;
      }
    }

    list EP_S1U {
      description "Represents the local end point of the logical link,
        supporting S1-U interface towards a S-GW node.";
      reference "3GPP TS 28.541, 3GPP TS 36.410";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_S1UGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction" {
    if-feature EPClassesUnderGNBDUFunction;

    list EP_F1C {
      description "Represents the local end point of the control plane
        interface (F1-C) between the DU and CU or CU-CP.";
      reference "3GPP TS 28.541, 3GPP TS 38.470";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_F1CGrp;
      }
    }

    list EP_F1U {
      description "Represents the local end point of the user plane
        interface (F1-U) between the DU and CU or CU-UP.";
      reference "3GPP TS 28.541, 3GPP TS 38.470";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EP_F1UGrp;
      }
    }
  }
}
<CODE ENDS>
```

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

```
module _3gpp-nr-nrm-eutrancellrelation {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-eutrancellrelation";
```

```
  prefix "eutrancellrel3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the EUtranCellRelation Information
    Object Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  typedef ActionAllowed {
    type enumeration {
      enum YES;
      enum NO;
    }
  }

  typedef EnergySavingCoverage {
    type enumeration {
      enum YES;
      enum NO;
      enum PARTIAL;
    }
  }

  grouping EUtranCellRelationGrp {
    description "Represents the EUtranCellRelation IOC.";
    reference "3GPP TS 28.541, EUtranRelation in 3GPP TS 28.658";
    uses mf3gpp:ManagedFunctionGrp;

    leaf tCI {
      description "Target Cell Identifier. Consists of E-UTRAN Cell Global
        Identifier (ECGI) and Physical Cell Identifier (PCI) of the target
        cell. Identifies the target cell from the perspective of the parent
        cell instance.";
      mandatory true;
      type uint64;
    }

    leaf isRemoveAllowed {
      description "Indicates if the subject EUtranCellRelation can be removed
        (deleted) or not. If YES, the subject EUtranCellRelation instance can
        be removed (deleted). If NO, the subject EUtranCellRelation instance
        shall not be removed (deleted) by any entity but an IRPManager.";
      mandatory true;
      type ActionAllowed;
    }

    leaf isHOAllowed {
      description "Indicates if handover is allowed or prohibited. If YES,
        handover is allowed from source cell to target cell. Source cell is
        represented by the parent cell instance. Target cell is the adjacent
        cell referenced by this EUtranCellRelation instance. If NO, handover
        shall not be allowed.";
      mandatory true;
      type ActionAllowed;
    }
    leaf isENDCAllowed {
      description "Indicates if EN-DC is allowed or prohibited. If TRUE,
        the target cell is allowed to be used for EN-DC. The target cell is
        referenced by the NRCellRelation that contains this isENDCAllowed.
        If FALSE, EN-DC shall not be allowed.";
      mandatory true;
      type ActionAllowed;
    }


    leaf isICICInformationSendAllowed {
      description "Indicates if ICIC (Inter Cell Interference Coordination)
```

```
        load information message sending is allowed or prohibited. If YES,
        ICIC load information message sending is allowed from source cell to
        target cell. Source cell is represented by the parent cell instance.
        Target cell is the adjacent cell referenced by this EUtranCellRelation
        instance. If NO, ICIC load information message sending shall not be
        allowed.";
      reference "3GPP TS 36.423";
      mandatory true;
      type ActionAllowed;
    }

    leaf isLBAllowed {
      description "Indicates if load balancing is allowed or prohibited from
        source cell to target cell. If YES, load balancing is allowed from
        source cell to target cell. Source cell is represented by the parent
        cell instance. Target cell is the adjacent cell referenced by this
        EUtranCellRelation instance. If NO, load balancing shall be prohibited
        from source cell to target cell.";
      mandatory true;
      type ActionAllowed;
    }

    leaf isESCoveredBy {
      description "Indicates whether the adjacent cell according to this
        planning provides no, partial or full coverage for the parent cell
        instance. Adjacent cells with this attribute equal to YES are
        recommended to be considered as candidate cells to take over the
        coverage when the original cell is about to be transferred to energy
        saving state. The entirety of adjacent cells with this property equal
        to PARTIAL are recommended to be considered as entirety of candidate
        cells to take over the coverage when the original cell is about to be
        transferred to energy saving state.";
      mandatory true;
      type EnergySavingCoverage;
    }

    leaf qOffset {
      description "Offset applicable to a specific neighbouring cell used for
        evaluating the cell as a candidate for cell re-selection. Corresponds
        to parameter q-OffsetCell broadcast in SIB4 for intra-frequency cells
        and in SIB5 for inter-frequency cells. Used for Mobility Robustness
        Optimization.";
      reference "3GPP TS 36.331";
      mandatory true;
      type types3gpp:QOffsetRange;
    }

    leaf cellIndividualOffset {
      description "Offset applicable to a neighbouring cell. It is used for
        evaluating the neighbouring cell for handover in connected mode. Used
        by the HandOver parameter Optimization (HOO) function or Load
        Balancing Optimization (LBO) function.";
      reference "3GPP TS 36.331";
      config false;
      type types3gpp:QOffsetRange;
    }

    leaf adjacentCell {
      description "Reference to an EUtranCellFDD/TDD or
        ExternalEUtranCellFDD/TDD instance.";
      mandatory true;
      type types3gpp:DistinguishedName;
    }
  }

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

    list EUtranCellRelation {
      description "Represents a relation between an NR cell and an E-UTRAN cell.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EUtranCellRelationGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
```

```
}
```

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

```
module _3gpp-nr-nrm-eutranetwork {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-eutranetwork";
  prefix "eutranet3gpp";

  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the EUtraNetwork Information Object
    Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

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

  feature ExternalsUnderEUtraNetwork {
    description "Classes representing external entities like EUtranFrequency,
      ExternalENBFunction are contained under a EUtraNetwork list/class.";
  }

  grouping EUtraNetworkGrp {
    description "Represents the EUtraNetwork IOC.";
    reference "3GPP TS 28.541";
    uses subnet3gpp:SubNetworkGrp;
  }

  list EUtraNetwork {
    description "A subnetwork containing gNB external E-UTRAN entities.";
      reference "3GPP TS 28.541";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses EUtraNetworkGrp;
      leaf-list parents {
        description "Reference to all containg EUtraNetwork instances
          in strict order from the root EUtraNetwork down to the immediate
          parent EUtraNetwork.
          If EUtraNetworks form a containment hierarchy this is
          modeled using references between the child EUtraNetwork and the parent
          EUtraNetworks.
          This reference MUST NOT be present for the top level EUtraNetwork and
          MUST be present for other EUtraNetworks.";
        type leafref {
          path "../../../EUtraNetwork/id";
        }
      }

      leaf-list containedChildren{
        description "Reference to all directly contained EUtraNetwork instances.
          If EUtraNetworks form a containment hierarchy this is
          modeled using references between the child EUtraNetwork and the parent
          EUtraNetwork.";
        type leafref {
          path "../../../EUtraNetwork/id";
        }
      }
    }
  }
}
```

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

```
module _3gpp-nr-nrm-eutranfreqrelation {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-eutranfreqrelation";
  prefix "eutranfreqrel3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
```

```
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the EUtranFreqRelation Information
    Object Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping EUtranFreqRelationGrp {
    description "Represents the EUtranFreqRelation IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf cellIndividualOffset {
      description "Offset applicable to a neighbouring cell. Used for
        evaluating the neighbouring cell for handover in connected mode.
        Used by the HandOver parameter Optimization (HOO) function or
        Load Balancing Optimization (LBO) function.";
      reference "cellIndividualOffset in MeasObjectEUTRA in 3GPP TS 38.331";
      default 0;
      type types3gpp:QOffsetRange;
    }

    leaf-list blackListEntry {
      description "A list of Physical Cell Identities (PCIs) that are
        blacklisted in E-UTRAN measurements.";
      reference "3GPP TS 38.331";
      min-elements 0;
      type uint16 { range "0..1007"; }
    }

    leaf-list blackListEntryIdleMode {
      description "A list of Physical Cell Identities (PCIs) that are
        blacklisted in SIB4 and SIB5.";
      min-elements 0;
      type uint16 { range "0..1007"; }
    }

    leaf cellReselectionPriority {
      description "The absolute priority of the carrier frequency used by the
        cell reselection procedure. Value 0 means lowest priority. The value
        must not already used by other RAT, i.e. equal priorities between RATs
        are not supported. The UE behaviour when no value is entered is
        specified in subclause 5.2.4.1 of 3GPP TS 38.304.";
      reference "CellReselectionPriority in 3GPP TS 38.331, priority in
        3GPP TS 38.304";
      mandatory true;
      type int32 { range "0..7"; }
    }

    leaf cellReselectionSubPriority {
      description "Indicates a fractional value to be added to the value of
        cellReselectionPriority to obtain the absolute priority of the
        concerned carrier frequency for E-UTRA and NR.";
      reference "3GPP TS 38.331";
      type uint8 { range "2 | 4 | 6 | 8"; }
      units "0.1";
    }

    leaf pMax {
      description "Used for calculation of the parameter Pcompensation
        (defined in 3GPP TS 38.304), at cell reselection to a cell.";
      reference "PEMAX in 3GPP TS 38.101-1";
      mandatory true;
      type int32 { range "-30..33"; }
      units dBm;
    }

    leaf qOffsetFreq {
      description "The frequency specific offset applied when evaluating
        candidates for cell reselection.";
      type int32;
```

```
      default 0;
    }

    leaf qQualMin {
      description "Indicates the minimum required quality level in the cell.
        Value 0 means that it is not sent and UE applies in such case the
        (default) value of negative infinity for Qqualmin. Sent in SIB3 or
        SIB5.";
      reference "qQualMin in TS 38.304";
      mandatory true;
      type int32 { range "-34..-3 | 0"; }
      units dB;
    }

    leaf qRxLevMin {
      description "Indicates the required minimum received Reference Symbol
        Received Power (RSRP) level in the (E-UTRA) frequency for cell
        reselection. Broadcast in SIB3 or SIB5, depending on whether the
        related frequency is intra- or inter-frequency. Resolution is 2.";
      reference "Qrxlevmin in 3GPP TS 38.304";
      mandatory true;
      type int32 { range "-140..-44"; }
      units dBm;
    }

    leaf threshXHighP {
      description "Specifies the Srxlev threshold used by the UE when
        reselecting towards a higher priority RAT/frequency than the current
        serving frequency. Each frequency of NR and E-UTRAN might have a
        specific threshold. Resolution is 2.";
      reference "ThreshX, HighP in 3GPP TS 38.304";
      mandatory true;
      type int32 { range "0..62"; }
      units dB;
    }

    leaf threshXHighQ {
      description "Specifies the Squal threshold used by the UE when
        reselecting towards a higher priority RAT/frequency than the current
        serving frequency. Each frequency of NR and E-UTRAN might have a
        specific threshold.";
      reference "ThreshX, HighQ in 3GPP TS 38.304";
      mandatory true;
      type int32 { range 0..31; }
      units dB;
    }

    leaf threshXLowP {
      description "Specifies the Srxlev threshold used by the UE when
        reselecting towards a lower priority RAT/frequency than the current
        serving frequency. Each frequency of NR and E-UTRAN might have a
        specific threshold. Resolution is 2.";
      reference "ThreshX, LowP in 3GPP TS 38.304";
      mandatory true;
      type int32 { range "0..62"; }
      units dB;
    }

    leaf threshXLowQ {
      description "Specifies the Squal threshold used by the UE when
        reselecting towards a lower priority RAT/frequency than the current
        serving frequency. Each frequency of NR and E-UTRAN might have a
        specific threshold.";
      reference "ThreshX, LowQ in 3GPP TS 38.304";
      mandatory false;
      type int32 { range "0..31"; }
      units dB;
    }

    leaf tReselectionEutra {
      description "Cell reselection timer for intra frequency E-UTRA cell
        reselection. May be used for Mobility Robustness Optimization.";
      reference "t-ReselectionEUTRA in 3GPP TS 36.331 and in 3GPP TS 23.207";
      mandatory true;
      type uint8 { range "0..7"; }
      units s;
    }
```

```
    leaf tReselectionEutraSfHigh {
      description "The attribute tReselectionEutra (parameter TreselectionEUTRA
        in 3GPP TS 38.304) multiplied with this scaling factor if the UE is in
        high mobility state.";
      reference "Speed dependent ScalingFactor for TreselectionEUTRA for high
        mobility state in 3GPP TS 38.304";
      mandatory true;
      type uint8 { range "25 | 50 | 75 | 100"; }
      units %;
    }

    leaf tReselectionEutraSfMedium {
      description "The attribute tReselectionEutra (parameter TreselectionEUTRA
        in 3GPP TS 38.304) multiplied with this scaling factor if the UE is in
        medium mobility state.";
      reference "Speed dependent ScalingFactor for TreselectionEUTRA for medium
        mobility state in 3GPP TS 38.304";
      mandatory true;
      type uint8 { range "25 | 50 | 75 | 100"; }
      units %;
    }

    leaf eUtranFrequencyRef {
      description "Reference to a corresponding EUtranFrequency instance.";
        mandatory true;
        type types3gpp:DistinguishedName;
    }
  }

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

    list EUtranFreqRelation {
      description "Represents a frequency relation between an NR cell and an
        E-UTRAN cell.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EUtranFreqRelationGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

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

```
module _3gpp-nr-nrm-eutranfrequency {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-eutranfrequency";
  prefix "eutraneteutranfreq3gpp";

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-nr-nrm-eutranetwork { prefix eutranet3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the EUtranFrequency Information
    Object Class (IOC), that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM),
    3GPP TS 28.658 (E-UTRAN) Network Resource Model (NRM)";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping EUtranFrequencyGrp {
    description "Represents the EUtranFrequency IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf earfcnDL {
      description "Specifies the channel number for the central DL frequency.";
      reference "3GPP TS 36.101";
      mandatory true;
```

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

    leaf-list multiBandInfoListEutra {
      description "List of additional frequency bands the frequency belongs to.";
      config false;
      min-elements 0;
      type uint16 { range "1..256"; }
    }
  }

  grouping EUtranFrequencyWrapper {
    list EUtranFrequency {
      description "Represents certain E-UTRAN frequency properties.";
      reference "3GPP TS 28.658";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses EUtranFrequencyGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:ExternalsUnderSubNetwork ;
    uses EUtranFrequencyWrapper ;
  }

  augment "/eutranet3gpp:EUtraNetwork" {
    if-feature eutranet3gpp:ExternalsUnderEUtraNetwork;
    uses EUtranFrequencyWrapper ;
  }
}
```

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

```
module _3gpp-nr-nrm-externalamffunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-externalamffunction";
  prefix "extamf3gpp";

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the ExternalAMFFunction Information
    Object Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping ExternalAMFFunctionGrp {
    description "Represents the ExternalAMFFunction IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    list pLMNIdList {
      description "List of at most six entries of PLMN Identifiers, but at least
        one (the primary PLMN Id).
        The PLMN Identifier is composed of a Mobile Country Code (MCC) and a
        Mobile Network Code (MNC).";
      min-elements 1;
      max-elements 6;
      key "mcc mnc";
      uses types3gpp:PLMNId;
    }

    container aMFIdentifier {
```

```
      presence true;
      description "An AMF identifier, comprising an AMF Region ID, an AMF Set ID and an AMF
Pointer.";
      uses types3gpp:AmfIdentifier;
    }
  }

  grouping ExternalAMFFunctionWrapper {
    list ExternalAMFFunction {
      description "Represents the properties, known by the management
        function, of a AMFFunction managed by another management
        function.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalAMFFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:ExternalsUnderSubNetwork ;
    uses ExternalAMFFunctionWrapper;
  }

  augment "/nrnet3gpp:NRNetwork" {
    if-feature nrnet3gpp:ExternalsUnderNRNetwork;
    uses ExternalAMFFunctionWrapper;
  }
}
```

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

```
module _3gpp-nr-nrm-externalenbfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-externalenbfunction";
  prefix "extenb3gpp";

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-nr-nrm-eutranetwork { prefix eutranet3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the ExternalENBFunction
    Information Object Class (IOC) that is part of the NR Network Resource
    Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM),
    3GPP TS 28.658 (E-UTRAN) Network Resource Model (NRM)";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping ExternalENBFunctionGrp {
    description "Represets the ExternalENBFunction IOC.";
    reference "3GPP TS 28.658";
    uses mf3gpp:ManagedFunctionGrp;

    leaf eNBId {
      description "Unambiguously identifies an eNodeB within a PLMN.";
      reference "3GPP TS 36.413, 3GPP TS 36.300";
      mandatory true;
      type int32 { range "0..268435455"; } // Representing 28 bit eNB ID.
                                           // 18, 20 and 21 bit eNB IDs also
                                           // allowed.
    }
  }

  grouping ExternalENBFunctionWrapper {
    list ExternalENBFunction {
      description "Represents an external eNB functionality.";
```

```
      reference "3GPP TS 28.658";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalENBFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:ExternalsUnderSubNetwork ;
    uses ExternalENBFunctionWrapper;
  }

  augment "/eutranet3gpp:EUtraNetwork" {
    if-feature eutranet3gpp:ExternalsUnderEUtraNetwork;
    uses ExternalENBFunctionWrapper;
  }
}
```

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

```
module _3gpp-nr-nrm-externaleutrancell {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-externaleutrancell";
  prefix "exteutrancell3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-nr-nrm-eutranetwork { prefix eutranet3gpp; }
  import _3gpp-nr-nrm-externalenbfunction { prefix extenb3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the ExternalEUtranCellFDD and
    ExternalEUtranCellTDD Information Object Classes (IOCs) that are part
    of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM),
    3GPP TS 28.658 (E-UTRAN) Network Resource Model (NRM)";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping ExternalEUtranGenericCellGrp {
    description "Represents the ExternalEUtranGenericCell IOC.";
    reference "3GPP TS 28.658";
    uses mf3gpp:ManagedFunctionGrp;

    leaf pci {
      description "The Physical Cell Identity (PCI) of the cell (for
        NM-Centralized, EM-Centralized and Distributed PCI assignment cases).
        In the case of NM-Centralized PCI assignment, see 3GPP TS 36.300.";
      reference "3GPP TS 36.211";
      mandatory true;
      type int32 { range "0..503"; }
    }

    list plmnIdList {
      description "List of unique identities for PLMNs. A cell can broadcast
        up to 6 PLMN IDs. This is to support the case that one cell can be
        used by up to 6 operator's core networks. The PLMN(s) included in this
        list will use the same single tracking area code (TAC) and the same
        Cell Identity (cellLocalId) for sharing the radio access network
        resources. One member of plmnIdList is the primary PLMN ID. A PLMN ID
        included in this list cannot be included in the cellAccessInfoList.
        The PLMN ID is composed of a Mobile Country Code (MCC) and a Mobile
        Network Code (MNC).";
      reference "3GPP TS 36.300, 3GPP TS 36.331, 3GPP TS 23.003";
      key "mcc mnc";
      min-elements 1;
      max-elements 6;
      uses types3gpp:PLMNId;
```

```
    }

    leaf cellLocalId {
      description "Unambiguously identifies a cell within an eNodeB.";
      reference "NCI defined in 3GPP TS 38.300";
      type int32 {range "0..255"; }
    }

    leaf eNBId {
      description "Unambiguously identifies an eNodeB within a PLMN.";
      reference "3GPP TS 36.413, 3GPP TS 36.300";
      mandatory true;
      type int32 { range "0..268435455"; } // Representing 28 bit eNB ID.
                                           // 18, 20 and 21 bit eNB IDs also
                                           // allowed.
    }
  }

  grouping ExternalEUtranCellFDDGrp {
    description "Represents the ExternalEUtranCellFDD IOC.";
    reference "3GPP TS 28.658";
    uses ExternalEUtranGenericCellGrp;

    leaf earfcnDL {
      description "The channel number for the central DL frequency.";
      reference "3GPP TS 36.101";
      mandatory true;
      type int32 { range "0..17999 | 46590..262143"; }
    }

    leaf earfcnUL {
      description "The channel number for the central UL frequency. Value 0
        means that the UL channel number is N/A for the DL-only bands.";
      reference "3GPP TS 36.101";
      mandatory true;
      type int32 { range "0 | 18000..35999 | 46590..262143"; }
    }
  }

  grouping ExternalEUtranCellTDDGrp {
    description "Represents the ExternalEUtranCellTDD IOC.";
    reference "3GPP TS 28.658";
    uses ExternalEUtranGenericCellGrp;

    leaf earfcn {
      description "The frequency number for the central frequency.";
      reference "3GPP TS 36.104";
      mandatory true;
      type int32 { range "36000..262143"; }
    }
  }

  grouping ExternalEUtranCellFDDWrapper {
    list ExternalEUtranCellFDD {
      description "Represents the common properties of external E-UTRAN FDD
        cell provided by eNB or NG-RAN FDD cell provided by ng-eNB.";
      reference "3GPP TS 28.658";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalEUtranCellFDDGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }

  grouping ExternalEUtranCellTDDWrapper {
    list ExternalEUtranCellTDD {
      description "Represents the common properties of external E-UTRAN cell
        TDD provided by eNB or NG-RAN TDD cell provided by ng-eNB.";
      reference "3GPP TS 28.658";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalEUtranCellTDDGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
```

```
  }

  augment "/subnet3gpp:SubNetwork/extenb3gpp:ExternalENBFunction" {
    if-feature subnet3gpp:ExternalsUnderSubNetwork;
    uses ExternalEUtranCellFDDWrapper;
  }

  augment "/eutranet3gpp:EUtraNetwork/extenb3gpp:ExternalENBFunction" {
    if-feature eutranet3gpp:ExternalsUnderEUtraNetwork;
    uses ExternalEUtranCellFDDWrapper;
  }

  augment "/subnet3gpp:SubNetwork/extenb3gpp:ExternalENBFunction" {
    if-feature subnet3gpp:ExternalsUnderSubNetwork;
    uses ExternalEUtranCellTDDWrapper;
  }

  augment "/eutranet3gpp:EUtraNetwork/extenb3gpp:ExternalENBFunction" {
    if-feature eutranet3gpp:ExternalsUnderEUtraNetwork;
    uses ExternalEUtranCellTDDWrapper;
  }
}
```

E.5.10 module _3gpp-nr-nrm-externalgnbcucpfunction@2019-10-28.yang

```
module _3gpp-nr-nrm-externalgnbcucpfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-externalgnbcucpfunction";
  prefix "extgnbcucp3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the ExternalGNBCUCPFunction
    Information Object Class (IOC), that is part of the NR Network Resource
    Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping ExternalGNBCUCPFunctionGrp {
    description "Represets the ExternalGNBCUCPFunction IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf gNBId {
      description "Identifies a gNB within a PLMN.";
      reference "gNB Identifier (gNB ID) in 3GPP TS 38.300, Global gNB ID
        in 3GPP TS 38.413";
      mandatory true;
      type int64 { range "0..4294967295"; }
    }

    leaf gNBIdLength {
      description "Indicates the number of bits for encoding the gNB ID.";
      reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";
      mandatory true;
      type int32 { range "22..32"; }
    }

    list pLMNId {
      description "Specifies the PLMN identifier to be used as part of the
        global RAN node identity.";
      key "mcc mnc";
      min-elements 1;
      max-elements 1;
      uses types3gpp:PLMNId;
    }
```

```
  }

  grouping ExternalGNBCUCPFunctionWrapper {
    list ExternalGNBCUCPFunction {
      description "Represents the properties, known by the management function,
        of a GNBCUCPFunction managed by another management function.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalGNBCUCPFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:ExternalsUnderSubNetwork ;
    uses ExternalGNBCUCPFunctionWrapper;
  }

  augment "/nrnet3gpp:NRNetwork" {
    if-feature nrnet3gpp:ExternalsUnderNRNetwork;
    uses ExternalGNBCUCPFunctionWrapper;
  }
}
```

E.5.11 module _3gpp-nr-nrm-externalgnbcuupfunction@2019-10-28.yang

```
module _3gpp-nr-nrm-externalgnbcuupfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-externalgnbcuupfunction";
  prefix "extgnbcuup3gpp";

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the ExternalGNBCUUPFunction
    Information Object Class (IOC), that is part of the NR Network
    Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping ExternalGNBCUUPFunctionGrp {
    description "Represets the ExternalGNBCUUPFunction IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf gNBId {
      description "Identifies a gNB within a PLMN.";
      reference "gNB Identifier (gNB ID) in 3GPP TS 38.300, Global gNB ID
        in 3GPP TS 38.413";
      mandatory true;
      type int64 { range "0..4294967295"; }
    }

    leaf gNBIdLength {
      description "Indicates the number of bits for encoding the gNB ID.";
      reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";
      mandatory true;
      type int32 { range "22..32"; }
    }
  }

  grouping ExternalGNBCUUPFunctionWrapper {
    list ExternalGNBCUUPFunction {
      description "Represents the properties, known by the management function,
        of a GNBCUUPFunction managed by another management function.";
```

```
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalGNBCUUPFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:ExternalsUnderSubNetwork ;
    uses ExternalGNBCUUPFunctionWrapper;
  }

  augment "/nrnet3gpp:NRNetwork" {
    if-feature nrnet3gpp:ExternalsUnderNRNetwork;
    uses ExternalGNBCUUPFunctionWrapper;
  }
}
```

E.5.12 module _3gpp-nr-nrm-externalgnbdufunction@2019-10-28.yang

```
module _3gpp-nr-nrm-externalgnbdufunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-externalgnbdufunction";
  prefix "extgnbdu3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the ExternalGNBDUFunction
    Information Object Class (IOC) that is part of the NR Network Resource
    Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping ExternalGNBDUFunctionGrp {
    description "Represets the ExternalGNBDUFunction IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf gNBId {
      description "Identifies a gNB within a PLMN.";
      reference "gNB Identifier (gNB ID) in 3GPP TS 38.300, Global gNB ID
        in 3GPP TS 38.413";
      mandatory true;
      type int64 { range "0..4294967295"; }
    }

    leaf gNBIdLength {
      description "Indicates the number of bits for encoding the gNB ID.";
      reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";
      mandatory true;
      type int32 { range "22..32"; }
    }

    list pLMNId {
      description "Specifies the PLMN identifier to be used as part of the
        global RAN node identity.";
      key "mcc mnc";
      min-elements 1;
      max-elements 1;
      uses types3gpp:PLMNId;
    }
  }
```

```
  grouping ExternalGNBDUFunctionWrapper {
    list ExternalGNBDUFunction {
      description "Represents the properties, known by the management function,
        of a GNBDUFunction managed by another management function.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalGNBDUFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:ExternalsUnderSubNetwork ;
    uses ExternalGNBDUFunctionWrapper;
  }

  augment "/nrnet3gpp:NRNetwork" {
    if-feature nrnet3gpp:ExternalsUnderNRNetwork;
    uses ExternalGNBDUFunctionWrapper;
  }
}
```

E.5.13 module _3gpp-nr-nrm-externalnrcellcu@2019-10-28.yang

```
module _3gpp-nr-nrm-externalnrcellcu {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-externalnrcellcu";
  prefix "extnrcellcu3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-nr-nrm-externalgnbcucpfunction { prefix extgnbcucp3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the ExternalNRCellCU Information
    Object Class (IOC), that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

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

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

  grouping ExternalNRCellCUGrp {
    description "Represents the ExternalNRCellCU IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf cellLocalId {
      description "Identifies an NR cell of a gNB. Together with corresponding
        gNB ID it forms the NR Cell Identifier (NCI).";
      reference "NCI in 3GPP TS 38.300";
      mandatory true;
      type int32 {range "0..16383"; }
    }

    leaf nRPCI {
      description "The Physical Cell Identity (PCI) of the NR cell.";
      reference "3GPP TS 36.211";
      mandatory true;
      type int32 { range "0..1007"; }
    }

    list pLMNIdList {
      description "Defines which PLMNs that are assumed to be served by the
        NR cell in another gNB CU-CP. This list is either updated by the
        managed element itself (e.g. due to ANR, signalling over Xn, etc.) or
        by consumer over the standard interface.";
      key "mcc mnc";
      min-elements 1;
```

```
      max-elements 12;
      uses types3gpp:PLMNId;
    }

    leaf nRFrequencyRef {
      description "Reference to corresponding NRFrequency instance.";
      mandatory true;
      type types3gpp:DistinguishedName;
    }
  }

  grouping ExternalNRCellCUWrapper {
    list ExternalNRCellCU {
      description "Represents the properties of an NRCellCU controlled by
        another Management Service Provider.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalNRCellCUGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }

  augment "/subnet3gpp:SubNetwork/extgnbcucp3gpp:ExternalGNBCUCPFunction" {
    if-feature subnet3gpp:ExternalsUnderSubNetwork ;
    uses ExternalNRCellCUWrapper;
  }

  augment "/nrnet3gpp:NRNetwork/extgnbcucp3gpp:ExternalGNBCUCPFunction" {
    if-feature nrnet3gpp:ExternalsUnderNRNetwork;
    uses ExternalNRCellCUWrapper;
  }
}
```

E.5.14 module _3gpp-nr-nrm-externalservinggwfunction@2019-10-28.yang

```
module _3gpp-nr-nrm-externalservinggwfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-externalservinggwfunction";
  prefix "extservgw3gpp";

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-nr-nrm-eutranetwork { prefix eutranet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the ExternalServingGWFunction
    Information Object Class (IOC) that is part of the NR Network Resource
    Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping ExternalServingGWFunctionGrp {
    description "Represents the ExternalServingGWFunction IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;
  }

  grouping ExternalServingGWFunctionWrapper {
    list ExternalServingGWFunction {
      description "Represents the properties, known by the management
        function, of a ServingGWFunction managed by another management
        function.";
      reference "3GPP TS 28.658";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalServingGWFunctionGrp;
```

```
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:ExternalsUnderSubNetwork ;
    uses ExternalServingGWFunctionWrapper;
  }

  augment "/eutranet3gpp:EUtraNetwork" {
    if-feature eutranet3gpp:ExternalsUnderEUtraNetwork;
    uses ExternalServingGWFunctionWrapper;
  }
}
```

E.5.15 module _3gpp-nr-nrm-externalupffunction@2019-10-28.yang

```
module _3gpp-nr-nrm-externalupffunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-externalupffunction";
  prefix "extupf3gpp";

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the ExternalUPFFunction Information
    Object Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping ExternalUPFFunctionGrp {
    description "Represents the ExternalUPFFunction IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;
  }

  grouping ExternalUPFFunctionWrapper {
    list ExternalUPFFunction {
      description "Represents the properties, known by the management
        function, of a UPFFunction managed by another management
        function.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses ExternalUPFFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:ExternalsUnderSubNetwork ;
    uses ExternalUPFFunctionWrapper;
  }

  augment "/nrnet3gpp:NRNetwork" {
    if-feature nrnet3gpp:ExternalsUnderNRNetwork;
    uses ExternalUPFFunctionWrapper;
  }
}
```

E.5.16 module _3gpp-nr-nrm-gnbcucpfunction.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-gnbcucpfunction {
```

```
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-gnbcucpfunction";
  prefix "gnbcucp3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-rrmpolicy { prefix nrrrmpolicy3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the GNBCUCPFunction Information
    Object Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2021-11-06 { reference "CR-0611"; }
  revision 2021-11-05 { reference "CR-0609"; }
  revision 2020-10-02 { reference CR-0384 ; }
  revision 2020-08-06 { reference "CR-0333"; }
  revision 2020-08-03 { reference "CR-0321"; }
  revision 2020-06-03 { reference "CR-0286"; }
  revision 2020-05-08 { reference S5-203316 ; }
  revision 2020-04-28 { reference "0260"; }
  revision 2020-02-14 { reference S5-20XXXX ; }
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  feature DESManagementFunction {
    description "Classs representing Distributed SON Energy Saving feature";
  }

  feature DANRManagementFunction {
    description "Classs representing D-SON function of ANR Management feature";
  }


  feature DMROFunction {
    description "Classs representing D-SON function of MRO feature";
  }

  grouping GNBCUCPFunctionGrp {
    description "Represents the GNBCUCPFunction IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;
    uses nrrrmpolicy3gpp:RRMPolicy_Grp;

    leaf gNBId {
      description "Identifies a gNB within a PLMN. The gNB Identifier (gNB ID)
        is part of the NR Cell Identifier (NCI) of the gNB cells.";
      reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";
      mandatory true;
      type int64 { range "0..4294967295"; }
    }

    leaf gNBIdLength {
      description "Indicates the number of bits for encoding the gNB ID.";
      reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";
      mandatory true;
      type int32 { range "22..32"; }
    }

    leaf gNBCUName {
      description "Identifies the Central Unit of an gNB.";
      reference "3GPP TS 38.473";
      mandatory true;
      type string { length "1..150"; }
    }

    list pLMNId {
      description "The PLMN identifier to be used as part of the global RAN
        node identity.";
      key "mcc mnc";
      min-elements 1;
      max-elements 1;
      uses types3gpp:PLMNId;
```

```
    }

    leaf-list x2BlackList {
      type string;
      description "List of nodes to which X2 connections are prohibited.";
    }

    leaf-list x2WhiteList {
      type string;
      description "List of nodes to which X2 connections are enforced.";
    }

    leaf-list xnBlackList {
      type string;
      description "List of nodes to which Xn connections are prohibited.";
    }

    leaf-list xnWhiteList {
      type string;
      description "List of nodes to which X2 connections are enforced.";
    }

    leaf-list xnHOBlackList {
      type string;
      description "List of nodes to which handovers over  Xn are prohibited.";
    }

    leaf configurable5QISetRef {
      type types3gpp:DistinguishedName;
      description "DN of the Configurable5QISet that the GNBCUCPFunction supports (is associated
to).";
    }

    leaf-list x2HOBlackList {
      type string;
      description "List of nodes to which handovers over X2 are prohibited.";
    }

    leaf dynamic5QISetRef {
      type types3gpp:DistinguishedName;
      description "DN of the Dynamic5QISet that the GNBCUCPFunction supports (is associated to).";
    }

    leaf dCHOControl {
      type boolean;
      description "This attribute determines whether the CHO function is enabled or disabled.";
    }
    leaf dDAPSHOControl {
      type boolean;
      description "This attribute determines whether the DAPS handover function
                   is enabled or disabled.";
    }
  }

  augment "/me3gpp:ManagedElement" {

    list GNBCUCPFunction {
      description "Represents the logical function CU-CP of gNB and en-gNB.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses GNBCUCPFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
<CODE ENDS>
```

E.5.17 module _3gpp-nr-nrm-gnbcuupfunction.yang

```
module _3gpp-nr-nrm-gnbcuupfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-gnbcuupfunction";
  prefix "gnbcuup3gpp";
```

```
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-rrmpolicy { prefix nrrrmpolicy3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the GNBCUUPFunction Information
    Object Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2020-11-05 { reference CR-0412 ; }
  revision 2020-08-06 { reference "CR-0333"; }
  revision 2020-08-03 { reference "CR-0321"; }
  revision 2020-06-03 { reference "CR-0286"; }
  revision 2020-05-28 { reference "CR-0318"; }
  revision 2020-03-12 { reference "SP-200233 S5-201547"; }
  revision 2020-02-14 { reference S5-20XXXX ; }
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-08-21 { reference "Initial revision"; }

  grouping TAIGrp {
    description "Tracking Area Identity";

    list pLMNId {
      key "mcc mnc";
      description "PLMN IDs for the Tracking area";
      uses types3gpp:PLMNId;
    }

    leaf nRTAC {
      type int64;
      description "Identity of the common Tracking Area Code for the PLMNs
        allowedValues:
        a) It is the TAC or Extended-TAC.
        b) A cell can only broadcast one TAC or Extended-TAC.
          See TS 36.300, subclause 10.1.7 (PLMNID and TAC relation).
        c) TAC is defined in subclause 19.4.2.3 of 3GPP TS 23.003 and
          Extended-TAC is defined in subclause 9.3.1.29 of 3GPP TS 38.473.
        d) For a 5G SA (Stand Alone), it has a non-null value.";
    }
  }

  grouping BackhaulAddressGrp {
    description "Indicates the backhauladdress of gNB.";

    leaf gNBId {
      type uint32 {
        range "0..4294967295";
      }
      description "It identifies a gNB within a PLMN. The gNB ID is part of
        the NR Cell Identifier (NCI) of the gNB cells.";
      reference "gNB Identifier (gNB ID) of subclause 8.2 of TS 38.300.
                 Global gNB ID in subclause 9.3.1.6 of TS 38.413";
    }

    list tAI {
      key nRTAC;
      min-elements 1;
      max-elements 1;
      description "Tracking Area Identity";
      reference "subclause 9.3.3.11 in TS 38.413";
      uses TAIGrp;
    }
  }

  grouping MappingSetIDBackhaulAddressGrp {
    description "Mapping relationship between setID and backhaulAddress of gNB";

    leaf idx {
      type uint32 ;
      description "ID value";
    }

    leaf setID {
      type uint32;
```

```
      mandatory true;
      description "Indicates the setID of gNB.";
      reference "Subclause 7.4.1.6 in TS 38.211";
    }

    list backhaulAddress {
      key gNBId;
      min-elements 1;
      max-elements 1;
      description "Indicates the backhauladdress of gNB.";
      uses BackhaulAddressGrp;
    }
  }
  grouping GNBCUUPFunctionGrp {
    description "Represents the GNBCUUPFunction IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;
    uses nrrrmpolicy3gpp:RRMPolicy_Grp;

    leaf gNBCUUPId {
      type uint64 {
        range "0..68719476735" ;
      }
      config false;
      mandatory true;
      description "Identifies the gNB-CU-UP at least within a gNB-CU-CP";
      reference "'gNB-CU-UP ID' in subclause 9.3.1.15 of 3GPP TS 38.463";
    }

    leaf gNBId {
      type uint32;
      mandatory true;
      description "Identifies a gNB within a PLMN. The gNB ID is part of the
        NR Cell Identifier (NCI) of the gNB cells. ";
      reference "gNB Identifier (gNB ID) of subclause 8.2 of TS 38.300.
         Global gNB ID in subclause 9.3.1.6 of TS 38.413";
    }

    leaf gNBIdLength {
      mandatory true;
      type int32 { range "22..32"; }
      description "Indicates the number of bits for encoding the gNB Id.";
      reference "gNB Id in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";
    }

    list pLMNInfoList {
      description "The PLMNInfoList is a list of PLMNInfo data type. It
        defines which PLMNs that can be served by the GNBCUUPFunction and
        which S-NSSAIs can be supported by the GNBCUUPFunction for
        corresponding PLMN in case of network slicing feature is supported";
      key "mcc mnc sd sst";
      uses types5g3gpp:PLMNInfo;
    }

    list mappingSetIDBackhaulAddressList {
      key idx;
      description "Specifies a list of mappingSetIDBackhaulAddress used to
        retrieve the backhaul address of the victim set.
        Must be present if Remote Interference Management function is
        supported.";
      uses MappingSetIDBackhaulAddressGrp;
    }

    leaf configurable5QISetRef {
      type types3gpp:DistinguishedName;
      description "DN of the Configurable5QISet that the GNBCUUPFunction
        supports (is associated to).";
    }
    leaf dynamic5QISetRef {
      type types3gpp:DistinguishedName;
      description "DN of the Dynamic5QISet that the GNBCUUPFunction
        supports (is associated to).";
    }
  }

  augment "/me3gpp:ManagedElement" {

    list GNBCUUPFunction {
```

```
      key id;
      description "Represents the logical function CU-UP of gNB or en-gNB.";
      reference "3GPP TS 28.541";
      uses top3gpp:Top_Grp;
      container attributes {
        uses GNBCUUPFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

E.5.18 module _3gpp-nr-nrm-gnbdufunction.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-gnbdufunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-gnbdufunction";
  prefix "gnbdu3gpp";

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-rrmpolicy { prefix nrrrmpolicy3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the GNBDUFunction Information
    Object Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2021-10-28 { reference CR-0607 ; }
  revision 2021-04-30 { reference CR-0490; }
  revision 2020-10-02 { reference CR-0384 ; }
  revision 2020-03-12 { reference "SP-200233 S5-201547" ; }
  revision 2020-02-14 { reference S5-20XXXX ; }
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-08-21 { reference "Initial revision."; }

  feature DRACHOptimizationFunction {
    description "Class representing D-SON function of RACH optimization
      feature";
  }

  grouping RimRSReportInfoGrp {
    description "This  data type defines necessary reporting information
      derived from the detected RIM-RS, including
      1)  The detected set ID;
      2)  Propagation delay in number of OFDM symbols
      3)  Functionality of the RS (RS-1 or RS-2, Enough or Not enough
        mitigation for RS-1).

      RS-1 is equivalent to RIM-RS type 1 (see 38.211, subclause 7.4.1.6).
      RS-2 is equivalent to RIM-RS type 2 (see 38.211, subclause 7.4.1.6).
        Enough mitigation for RS-1 means 'Enough' / 'Not enough' indication
          functionality is enabled for RIM RS-1 and RIM-RS type 1 is used to
          indicate 'enough mitigation' functionality.
        Not enough mitigation for RS-1 means 'Enough' / 'Not enough' indication
          functionality is enabled for RIM RS-1 and RIM-RS type 1 is used to
          indicate 'Not enough mitigation' functionality.";

    leaf detectedSetID {
      type uint32 ;
      description "Set ID of the detected RIM-RS
        allowedValues: 0,1...max{totalnrofSetIdofRS1, totalnrofSetIdofRS2}";
    }

    leaf propagationDelay {
      type uint32 ;
      must '. <= ../../maxPropagationDelay' {
        error-message "allowedValues: 0, 1.. maxPropagationDelay";
      }
      description "This attribute indicates the propagation delay of the
        detected RIM-RS, in number of OFDM symbol.";
    }
```

```
    leaf functionalityOfRIMRS {
      type enumeration {
        enum RS1;
        enum RS2;
        enum RS1_FOR_ENOUGH_MITIGATION;
        enum RS1_FOR_NOT_ENOUGH_MITIGATION;
      }
      mandatory true;
      description "Indicates the functionality of the detected RIM-RS.
        If the indication of enableEnoughNotEnoughIndication is 'enabled',
          valid values are {RS2, RS1forEnoughMitigation,
          RS1forNotEnoughMitigation};
        If the indication of enableEnoughNotEnoughIndication is 'disabled',
          valid values are {RS1, RS2}.

        RS1forEnoughMitigation means RIM-RS type 1 is used to indicate
         'enough mitigation' functionality.
        RS1forNotEnoughMitigation means RIM-RS type 1 is used to indicate
          'Not enough mitigation' functionality.";
    }
  }

  grouping RimRSReportConfGrp {
    description "Defines RIM-RS reporting configuration";

    leaf reportIndicator {
      type types3gpp:EnabledDisabled;
      default DISABLED;
      description "Used to enable or disable the RS report on a gNB.
        If the indication is 'enable', the gNB starts to periodically report
        necessary information derived from the detected RIM-RS to OAM.
        If the indication is 'disable', the gNB stops reporting.";
    }

    leaf reportInterval {
      type uint32;
      mandatory true;
      units ms;
      description "Used to define reporting interval of a gNB in ms.";
    }

    leaf nrofRIMRSReportInfo {
      type uint32;
      mandatory true;
      description "Used to define the maximum number of RIMRSReportInfo in
        a single report.";
    }

    leaf maxPropagationDelay {
      type uint32 {
        range "0..327679";
      }
      mandatory true;
      description "Used to define the maximum reported OFDM symbol number for
        the propagation delay of the detected RIM-RS in each RIMRSReportInfo.

        allowedValues: 0, 1..20**2*maxNrofSymbols-1, where maxNrofSymbols=14.";
    }

    list RimRSReportInfoList {
      key detectedSetID;
      description "Represents a list (the length of the list is
        nrofRIMRSReportInfo) of necessary information derived from the
        detected RIM-RS.";
      uses RimRSReportInfoGrp;
    }
  }
  grouping GNBDUFunctionGrp {
    description "Represents the GNBDUFunction IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;
    uses nrrrmpolicy3gpp:RRMPolicy_Grp;

    leaf gNBId {
      type int64 { range "0..4294967295"; }
      mandatory true;
      description "Identifies a gNB within a PLMN. The gNB Identifier (gNB ID)
        is part of the NR Cell Identifier (NCI) of the gNB cells.";
```

```
      reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";
    }

    leaf gNBIdLength {
      type int32 { range "22..32"; }
      mandatory true;
      description "Indicates the number of bits for encoding the gNB ID.";
      reference "gNB ID in 3GPP TS 38.300, Global gNB ID in 3GPP TS 38.413";
    }

    leaf gNBDUId {
      type int64 { range "0..68719476735"; }
      mandatory true;
      description "Uniquely identifies the DU at least within a gNB.";
      reference "3GPP TS 38.473";
    }

    leaf gNBDUName {
      type string { length "1..150"; }
      description "Identifies the Distributed Unit of an NR node";
      reference "3GPP TS 38.473";
    }

    list rimRSReportConf {
      key reportInterval;
      config false;
      min-elements 1;
      max-elements 1;
      description "Used to configure gNBs to report the all necessary
        information derived from the detected RIM-RS to OAM.";
      uses RimRSReportConfGrp;
    }
  }

  augment "/me3gpp:ManagedElement" {

    list GNBDUFunction {
   key id;
      description "Represents the logical function DU of gNB or en-gNB.";
      reference "3GPP TS 28.541";
      uses top3gpp:Top_Grp;
      container attributes {
        uses GNBDUFunctionGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
<CODE ENDS>
```

E.5.19 module _3gpp-nr-nrm-nrcellcu.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-nrcellcu {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-nrcellcu";
  prefix "nrcellcu3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the NRCellCU Information Object
    Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2021-01-25 { reference CR-0454 ; }
  revision 2020-11-25 { reference CR-0386 ; }
  revision 2020-11-05 { reference CR-0412 ; }
  revision 2020-10-02 { reference CR-0384 ; }
  revision 2020-05-08 { reference S5-203316 ; }
  revision 2020-02-14 { reference S5-20XXXX ; }
```

```
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 { reference "Initial revision"; }

  feature DPCIConfigurationFunction {
    description "Class representing Distributed SON
 function of PCI configuration feature";
  }

  feature DESManagementFunction {
    description "Class representing Distributed SON
      Energy Saving feature";
  }

  feature DMROFunction {
    description "Class representing D-SON function of MRO feature";
  }

  feature CESManagementFunction {
    description "Class representing Centralized SON Energy Saving
      feature";
  }

  grouping NRCellCUGrp {
    description "Represents the NRCellCU IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf cellLocalId {
      description "Identifies an NR cell of a gNB. Together with corresponding
        gNB ID it forms the NR Cell Identifier (NCI).";
      mandatory true;
      type int32 { range "0..16383"; }
    }

    list pLMNInfoList {
      description "The PLMNInfoList is a list of PLMNInfo data type. It defines
        which PLMNs that can be served by the NR cell, and which S-NSSAIs that
        can be supported by the NR cell for corresponding PLMN in case of
        network slicing feature is supported.";
      // Note: Whether the attribute pLMNId in the pLMNInfo can be writable
      // depends on the implementation.
      key "mcc mnc sd sst";
      min-elements 1;
      uses types5g3gpp:PLMNInfo;
    }

    leaf nRFrequencyRef {
      description "Reference to corresponding NRFrequency instance.";
      config false;
      type types3gpp:DistinguishedName;
    }
  }

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

    list NRCellCU {
      description "Represents the information required by CU that is
        responsible for the management of inter-cell mobility and neighbour
        relations via ANR.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses NRCellCUGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
<CODE ENDS>
```

E.5.20 module _3gpp-nr-nrm-nrcelldu.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-nrcelldu {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-nrcelldu";
```

```
  prefix "nrcelldu3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import ietf-yang-types { prefix yang; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the NRCellDU Information Object
    Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2022-07-27 { reference "CR-0769"; }
  revision 2021-10-28 { reference CR-0607 ; }
  revision 2021-01-25 { reference CR-0454 ; }
  revision 2020-11-25 { reference CR-0386 ; }
  revision 2020-11-05 { reference CR-0412 ; }
  revision 2020-10-02 { reference CR-0384 ; }
  revision 2020-05-08 { reference S5-203316 ; }
  revision 2020-02-14 { reference S5-20XXXX ; }
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-09-03 { reference "Initial revision"; }

  feature DRACHOptimizationFunction {
    description "Class representing D-SON function of RACH optimization
      feature";
  }

  feature CPCIConfigurationFunction {
    description "Class representing Centralized SON function of
      PCI configuration feature";
  }

  grouping NPNIdentityGrp {
    description "Represents the NPN supported by the <<IOC>> using this
      <<dataType>> as one of its attributes in case of the cell is a
      NPN-only cell.";

    list plmnid {
      key "mcc mnc";
      min-elements 1;
      description "PLMNId";
      uses types3gpp:PLMNId;
    }

    leaf cAGIdList {
      type string;
      mandatory true;
      description "It identifies a CAG list containing up to 12 CAG-identifiers
        per PLMN Identity, see TS 38.331.

        CAG is used for the PNI-NPNs to prevent UE(s), which are not allowed
        to access the NPN via the associated cell(s), from automatically
        selecting and accessing the associated CAG cell(s).

        CAG ID is used to combine with PLMN ID to identify a PNI-NPN.

        Exist if the cell is a NPN-only cell see TS 38.331";
    }

    leaf nIDList {
      type string;
      mandatory true;
      description "It identifies a list of NIDs containing up to 12 NIDs per
        PLMN Identity, see TS 38.331.

        NID is used to combine with PLMN ID to identify an SNPN.

        Exist if the cell is a NPN-only cell see TS 38.331";
    }
  }

  grouping NRCellDUGrp {
    description "Represents the NRCellDU IOC.";
```

```
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf cellLocalId {
      description "Identifies an NR cell of a gNB. Together with the
        corresponding gNB identifier in forms the NR Cell Identity (NCI).";
      reference "NCI in 3GPP TS 38.300";
      mandatory true;
      type int32 { range "0..16383"; }
    }

    leaf operationalState  {
      description "Operational state of the NRCellDU instance. Indicates
        whether the resource is installed and partially or fully operable
        (ENABLED) or the resource is not installed or not operable
        (DISABLED).";
      config false;
      type types3gpp:OperationalState;
    }

    leaf administrativeState  {
      description "Administrative state of the NRCellDU. Indicates the
        permission to use or prohibition against using the cell, imposed
        through the OAM services.";
      type types3gpp:AdministrativeState;
      default LOCKED;
    }

    leaf cellState  {
      description "Cell state of the NRCellDU instance. Indicates whether the
        cell is not currently in use (IDLE), or currently in use but not
        configured to carry traffic (INACTIVE), or currently in use and is
        configured to carry traffic (ACTIVE).";
      config false;
      type types3gpp:CellState;
    }

    list pLMNInfoList {
      description "The PLMNInfoList is a list of PLMNInfo data type. It
        defines which PLMNs that can be served by the NR cell, and which
        S-NSSAIs that can be supported by the NR cell for corresponding PLMN
        in case of network slicing feature is supported. The plMNId of the
        first entry of the list is the PLMNId used to construct the nCGI for
        the NR cell.";
      key "mcc mnc sd sst";
      min-elements 1;
      ordered-by user;
      uses types5g3gpp:PLMNInfo;
    }

    list nPNIdentityList {
      key idx ;
      min-elements 1;
      ordered-by user;
      description "It defines which NPNs that can be served by the NR cell,
        and which CAG IDs or NIDs can be supported by the NR cell for
        corresponding PNI-NPN or SNPN in case of the cell is NPN-only cell.";
      reference "3GPP TS 38.331";
      leaf idx { type uint32 ; }
      uses NPNIdentityGrp;
    }

    leaf nRPCI {
      description "The Physical Cell Identity (PCI) of the NR cell.";
      reference "3GPP TS 36.211";
      mandatory true;
      type int32 { range "0..1007"; }
    }

    leaf nRTAC {
      description "The common 5GS Tracking Area Code for the PLMNs.";
      reference "3GPP TS 23.003, 3GPP TS 38.473";
      type types3gpp:Tac;
    }

    leaf arfcnDL {
      description "NR Absolute Radio Frequency Channel Number (NR-ARFCN) for
        downlink.";
```

```
      reference "3GPP TS 38.104";
      mandatory true;
      type int32;
    }

    leaf arfcnUL {
      description "NR Absolute Radio Frequency Channel Number (NR-ARFCN) for
        uplink.";
      reference "3GPP TS 38.104";
      type int32;
    }

    leaf arfcnSUL {
      description "NR Absolute Radio Frequency Channel Number (NR-ARFCN) for
        supplementary uplink.";
      reference "3GPP TS 38.104";
      type int32;
    }

    leaf bSChannelBwDL {
      description "Base station channel bandwidth for downlink.";
      reference "3GPP TS 38.104";
      type int32;
      units MHz;
    }

    leaf rimRSMonitoringStartTime {
      type yang:date-and-time ;
      mandatory true;
      description "Configures the UTC time when the gNB attempts to start
        RIM-RS monitoring.";
     }

    leaf rimRSMonitoringStopTime {
      type yang:date-and-time ;
      mandatory true;
      description "Configures the UTC time when the gNB stops RIM-RS
        monitoring.";
     }

    leaf rimRSMonitoringWindowDuration {
      type uint32 {
        range 1..16384 ;
      }
      mandatory true;
      description "Configures a duration of the monitoring window  in which
        gNB monitors the RIM-RS, in unit of P_t, where P_t is the RIM-RS
        transmission periodicity in units of uplink-downlink switching period (
        see 38.211 subclause 7.4.1.6).

          This field is configured together with rimRSMonitoringInterval,
          rimRSMonitoringWindowStartingOffset, rimRSMonitoringOccasionInterval
          and rimRSMonitoringOccasionStartingOffset.
          The duration of the monitoring window is expected to be larger than
          or equal to M*P_t, where M is the interval between adjacent monitoring
          occasions within the monitoring window
          (configured by rimRSMonitoringInterval).
          The absolute duration of the monitoring window is not expected to be
          larger than the periodicity of the monitoring window (configured by
          rimRSMonitoringWindowPeriodicity).

          See 3GPP TS 28.541 attribute descrition rimRSMonitoringWindowDuration
          for the exact math formulas.

          Only the earliest N_T consecutive detection durations in each RIM-RS
          transmission periodicity (P_t) in the monitoring window are taken as
          valid time for monitoring potential interference, and they are
          consecutively monitored in the monitoring window, while the residual
          part of each RIM-RS transmission periodicity is not used for
          discovering potential interference, where, a consecutive detection
          duration spans P1*R1 (if only P1 is configured) or ((P1+P2))/2*R1 (
          if both P1 and P2 are configured), where,
            R1 is the number of consecutive uplink-downlinkswitching periods
              for RS-1 (configured by nrofConsecutiveRIMRS1),
            P1 is the first uplink-downlinkswitching period (configured by
              dlULSwitchingPeriod1),
            P2 is the second uplink-downlink switching period (configured by
              dlULSwitchingPeriod2), and
```

```
        N_T=
        ((N_setID # RIM,1)/(N_f # RI N_s # RIM,1)
            if enableEnoughNotEnoughIndication is 'disable'

        (2N_setID # RIM,1)/(N_f # RIM N_s # RIM,1)
            if enableEnoughNotEnoughIndication is 'enable'

      N_setID # 'RIM,1'  is the total number of set IDs for RIM RS-1
        (configured by totalnrofSetIdofRS1),
      N_f # RIM  is the number of candidate frequency resources in the whole
        network (configured by nrofGlobalRIMRSFrequencyCandidates), and
      N_s # 'RIM,1'  is the number of candidate sequences assigned for
        RIM RS-1 (configured by nrofRIMRSSequenceCandidatesofRS1).";
 }

leaf rimRSMonitoringWindowStartingOffset {
  type uint8 {
    range 0..23 ;
  }
  mandatory true;
  units hours;
  description "Configures the start offset of the first monitoring window
    within one day, in unit of hours.";
 }

leaf rimRSMonitoringWindowPeriodicity {
  type uint8 {
    range 1|2|3|4|6|8|12|24 ;
  }
  units hours;
  mandatory true;
  description "Configures the periodicity of the monitoring window, in
    unit of hours";
 }

leaf rimRSMonitoringOccasionInterval {
  type uint32 {
    range 1..max ;
  }
  mandatory true;
  description "Configures the interval between adjacent monitoring
    occasions (M) within the monitoring window, in unit of consecutive
    detection duration.
    M is expected to be prime to N_T, where N_T is given in above
    attribute rimRSMonitoringWindowDuration.
    allowedValues: 1,2..N_T-1";
 }

leaf rimRSMonitoringOccasionStartingOffset {
  type  uint32 ;
  mandatory true;
  description "Configures the start offset of the first monitoring occasions
    within the monitoring window (S_M), in unit of consecutive detection
    duration.
    gNB starts monitoring potential interference from the S_M-th consecutive
    detection duration in the first complete RIM-RS transmission
    periodicity (P_t) within the monitoring window.

    allowedValues: 0,1,2..M-1

    where M is the the interval between adjacent monitoring occasions
    within the monitoring window
    (configured by rimRSMonitoringOccasionInterval)";
 }

leaf ssbFrequency {
  description "Indicates cell defining SSB frequency domain position.
    Frequency (in terms of NR-ARFCN) of the cell defining SSB transmission.
    The frequency identifies the position of resource element RE=#0
    (subcarrier #0) of resource block RB#10 of the SS block. The frequency
    must be positioned on the NR global frequency raster, as defined in
    3GPP TS 38.101-1, and within bSChannelBwDL.";
  mandatory true;
  type int32 { range "0..3279165"; }
}

leaf ssbPeriodicity {
  description "Indicates cell defined SSB periodicity. The SSB periodicity
```

```
      is used for the rate matching purpose.";
      mandatory true;
      type int32 { range "5 | 10 | 20 | 40 | 80 | 160"; }
      units "subframes (ms)";
    }

    leaf ssbSubCarrierSpacing {
      description "Subcarrier spacing of SSB. Only the values 15 kHz or 30 kHz
        (< 6 GHz), 120 kHz or 240 kHz (> 6 GHz) are applicable.";
      reference "3GPP TS 38.211";
      mandatory true;
      type int32 { range "15 | 30 | 120 | 240"; }
      units kHz;
    }

    leaf ssbOffset {
      description "Indicates cell defining SSB time domain position. Defined
        as the offset of the measurement window, in which to receive SS/PBCH
        blocks, where allowed values depend on the ssbPeriodicity
        (ssbOffset < ssbPeriodicity).";
      mandatory true;
      type int32 { range "0..159"; }
      units "subframes (ms)";
    }

    leaf ssbDuration {
      description "Duration of the measurement window in which to receive
        SS/PBCH blocks.";
      reference "3GPP TS 38.213";
      mandatory true;
      type int32 { range "1..5"; }
      units "subframes (ms)";
    }

    leaf bSChannelBwUL {
      description "Base station channel bandwidth for uplink.";
      reference "3GPP TS 38.104";
      type int32;
      units MHz;
    }

    leaf bSChannelBwSUL {
      description "Base station channel bandwidth for supplementary uplink.";
      reference "3GPP TS 38.104";
      type int32;
      units MHz;
    }

    leaf-list nRSectorCarrierRef {
      description "Reference to corresponding NRSectorCarrier instance.";
      min-elements 1;
      type types3gpp:DistinguishedName;
    }

    leaf-list bWPRef {
      description "Reference to corresponding BWP instance.";
      type types3gpp:DistinguishedName;
    }

    leaf-list nRFrequencyRef {
      description "Reference to corresponding NRFrequency instance.";
      type types3gpp:DistinguishedName;
    }

    leaf victimSetRef {
      type types3gpp:DistinguishedName;
      mandatory true;
      description "DN of a victim Set (RimRSSet)
        Implemented if RIM feature is supported";
    }

    leaf aggressorSetRef {
      type types3gpp:DistinguishedName;
      mandatory true;
      description "DN of an aggressor Set (RimRSSet)";
    }
  }
```

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

    list NRCellDU {
      description "This IOC represents the part of NR cell information that
        describes s the specific resources instances.

        An NR cell transmits SS/PBCH block and always requires downlink
        transmission at a certain carrier frequency with a certain channel
        bandwidth. Transmission may be performed from multiple sector-carriers
        using different transmission points, and these may be configured with
        different carrier frequencies and channel bandwidths, as long as they
        are aligned to the cell's downlink resource grids as defined in
        subclause 4.4 in TS 38.211. The values of arfcnDL and bSChannelBwDL
        attributes define the resource grids which each sector-carrier needs to
        be aligned to. See subclauses 5.3 and 5.4.2 of TS 38.104 for definitions
        of BS channel bandwidth and NR-ARFCN, respectively.

        An NR cell requires an uplink in order to provide initial access. In
        case of TDD, the values of arfcnUL and bSChannelBwUL have to always be
        set to the same values as for the corresponding DL attributes. For both
        FDD and TDD, the arfcnUL and bSChannelBwUL define uplink resource grids
        to which each sector-carrier needs to align to.

        An NR cell can in addition be configured with a supplementary uplink,
        which has its own arfcnSUL and bSChannelBwSUL, which define resource
        grids for supplementary uplink sector-carriers.

        Each of downlink, uplink and supplementary uplink (if configured) need
        an initial bandwidth part (BWP), which defines resources to be used by
        UEs during and immediately after initial access. Additional BWPs can be
        either configured or calculated by gNB internally and be applied to UEs
        dynamically by gNB based on e.g. UE capability and bandwidth need of
        each UE.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses NRCellDUGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
<CODE ENDS>
```

E.5.21 module _3gpp-nr-nrm-nrcellrelation.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-nrcellrelation {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-nrcellrelation";
  prefix "nrcellrel3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the NRCellRelation Information
    Object Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2021-01-25 { reference CR-0454 ; }
  revision 2020-06-03 { reference S5-202333 ; }
  revision 2020-04-23 { reference CR0281 ; }
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-08-30 {
    description "Initial revision";
  }


  typedef EnergySavingCoverage {
    type enumeration {
      enum FULL;
      enum NO;
```

```
      enum PARTIAL;
    }
  }

  grouping NRCellRelationGrp {
    description "Represents the NRCellRelation IOC.";
    reference "3GPP TS 28.541";

    leaf nRTCI {
      description "Target NR Cell Identifier. It consists of NR Cell
        Identifier (NCI) and Physical Cell Identifier of the target NR cell
        (nRPCI).";
      type uint64;
    }

    container cellIndividualOffset {
      description "A set of offset values for the neighbour cell. Used when
        UE is in connected mode. Defined for rsrpOffsetSSB, rsrqOffsetSSB,
        sinrOffsetSSB, rsrpOffsetCSI-RS, rsrqOffsetCSI-RS and
        sinrOffsetCSI-RS.";
      reference "cellIndividualOffset in MeasObjectNR in 3GPP TS 38.331";

      leaf rsrpOffsetSsb {
        description "Offset value of rsrpOffsetSSB.";
        default 0;
        type types3gpp:QOffsetRange;
      }

      leaf rsrqOffsetSsb{
        description "Offset value of rsrqOffsetSSB.";
        default 0;
        type types3gpp:QOffsetRange;
      }

      leaf sinrOffsetSsb {
        description "Offset value of sinrOffsetSSB.";
        default 0;
        type types3gpp:QOffsetRange;
      }

      leaf rsrpOffsetCsiRs{
        description "Offset value of rsrpOffsetCSI-RS.";
        default 0;
        type types3gpp:QOffsetRange;
      }

      leaf rsrqOffsetCsiRs {
        description "Offset value of rsrqOffsetCSI-RS.";
        default 0;
        type types3gpp:QOffsetRange;
      }

      leaf sinrOffsetCsiRs {
        description "Offset value of sinrOffsetCSI-RS.";
        default 0;
        type types3gpp:QOffsetRange;
      }
    }

    leaf nRFreqRelationRef {
      description "Reference to a corresponding NRFreqRelation instance.";
      mandatory true;
      type types3gpp:DistinguishedName;
    }

    leaf adjacentNRCellRef {
      description "Reference to an adjacent NR cell (NRCellCU or
        ExternalNRCellCU).";
      mandatory true;
      type types3gpp:DistinguishedName;
    }

    leaf isRemoveAllowed {
      type boolean;
      default true;
      description "True if the ANR function in the node is allowed to remove this relation.";
    }
```

```
    leaf isHOAllowed {
      type boolean;
      default true;
      description "True if handovers are allowed over this relation.";
    }

    leaf isESCoveredBy {
      description "Indicates whether the adjacent cell
        provides no, partial or full coverage for the parent cell
        instance. Adjacent cells with this attribute equal to FULL are
        recommended to be considered as candidate cells to take over the
        coverage when the original cell is about to be changed to energy
        saving state. All adjacent cells with this property equal
        to PARTIAL are recommended to be considered as entirety of candidate
        cells to take over the coverage when the original cell is about to be
        changed to energy saving state.";
      type EnergySavingCoverage;
    }
  }

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

    list NRCellRelation {
      description "Represents a neighbour cell relation from a source cell
        to a target cell, where the target cell is an NRCellCU or
        ExternalNRCellCU instance.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses NRCellRelationGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
<CODE ENDS>
```

E.5.22 module _3gpp-nr-nrm-nrfreqrelation@2019-10-28.yang

```
module _3gpp-nr-nrm-nrfreqrelation {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-nrfreqrelation";
  prefix "nrfreqrel3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the NRFreqRelation Information
    Object Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2020-04-23 { reference CR0281 ; }
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping NRFreqRelationGrp {
    description "Represents the NRFreqRelation IOC.";
    reference "3GPP TS 28.541";

    container offsetMO {
      description "A set of offset values applicable to all measured cells
        with reference signal(s) indicated in corresponding MeasObjectNR. It
        is used to indicate a cell, beam or measurement object specific offset
        to be applied when evaluating candidates for cell re-selection or when
        evaluating triggering conditions for measurement reporting. It is
        defined for rsrpOffsetSSB, rsrqOffsetSSB, sinrOffsetSSB,
        rsrpOffsetCSI-RS, rsrqOffsetCSI-RS and sinrOffsetCSI-RS.";
      reference "offsetMO in MeasObjectNR in 3GPP TS 38.331";
```

```
      leaf rsrpOffsetSsb {
        description "Offset value of rsrpOffsetSSB.";
        default 0;
        type types3gpp:QOffsetRange;
      }

      leaf rsrqOffsetSsb {
        description "Offset value of rsrqOffsetSSB.";
        default 0;
        type types3gpp:QOffsetRange;
      }

      leaf sinrOffsetSsb {
        description "Offset value of sinrOffsetSSB.";
        default 0;
        type types3gpp:QOffsetRange;
      }

      leaf rsrpOffsetCsiRs {
        description "Offset value of rsrpOffsetCSI-RS.";
        default 0;
        type types3gpp:QOffsetRange;
      }

      leaf rsrqOffsetCsiRs {
        description "Offset value of rsrqOffsetCSI-RS.";
        default 0;
        type types3gpp:QOffsetRange;
      }

      leaf sinrOffsetCsiRs {
        description "Offset value of sinrOffsetCSI-RS.";
        default 0;
        type types3gpp:QOffsetRange;
      }
    }

    leaf-list blackListEntry {
      description "A list of Physical Cell Identities (PCIs) that are
        blacklisted in NR measurements.";
      reference "3GPP TS 38.331";
      min-elements 0;
      type uint16 { range "0..1007"; }
    }

    leaf-list blackListEntryIdleMode {
      description "A list of Physical Cell Identities (PCIs) that are
        blacklisted in SIB4 and SIB5.";
      min-elements 0;
      type uint16 { range "0..1007"; }
    }

    leaf cellReselectionPriority {
      description "The absolute priority of the carrier frequency used by the
        cell reselection procedure. Value 0 means lowest priority. The value
        must not already used by other RAT, i.e. equal priorities between RATs
        are not supported. The UE behaviour when no value is entered is
        specified in subclause 5.2.4.1 of 3GPP TS 38.304.";
      reference "CellReselectionPriority in 3GPP TS 38.331, priority in
        3GPP TS 38.304";
      type uint32;
      default 0;
    }

    leaf cellReselectionSubPriority {
      description "Indicates a fractional value to be added to the value of
        cellReselectionPriority to obtain the absolute priority of the
        concerned carrier frequency for E-UTRA and NR.";
      reference "3GPP TS 38.331";
      type uint8 { range "2 | 4 | 6 | 8"; }
      units "0.1";
    }

    leaf pMax {
      description "Used for calculation of the parameter Pcompensation
        (defined in 3GPP TS 38.304), at cell reselection to a cell.";
      reference "PEMAX in 3GPP TS 38.101-1";
      mandatory false;
```

```
      type int32 { range "-30..33"; }
      units dBm;
    }

    leaf qOffsetFreq {
      description "The frequency specific offset applied when evaluating
        candidates for cell reselection.";
      mandatory false;
      type types3gpp:QOffsetRange;
      default 0;
    }

    leaf qQualMin {
      description "Indicates the minimum required quality level in the cell.
        Value 0 means that it is not sent and UE applies in such case the
        (default) value of negative infinity for Qqualmin. Sent in SIB3 or
        SIB5.";
      reference "3GPP TS 38.304";
      type int32 { range "-34..-3 | 0"; }
      units dB;
      default 0;
    }

    leaf qRxLevMin {
      description "Indicates the required minimum received Reference Symbol
        Received Power (RSRP) level in the NR frequency for cell reselection.
        Broadcast in SIB3 or SIB5, depending on whether the related frequency
        is intra- or inter-frequency. Resolution is 2.";
      reference "3GPP TS 38.304";
      mandatory true;
      type int32 { range "-140..-44"; }
      units dBm;
    }

    leaf threshXHighP {
      description "Specifies the Srxlev threshold used by the UE when
        reselecting towards a higher priority RAT/frequency than the current
        serving frequency. Each frequency of NR and E-UTRAN might have a
        specific threshold. Resolution is 2.";
      reference "ThreshX, HighP in 3GPP TS 38.304";
      mandatory true;
      type int32 { range "0..62"; }
      units dB;
    }

    leaf threshXHighQ {
      description "Specifies the Squal threshold used by the UE when
        reselecting towards a higher priority RAT/frequency than the current
        serving frequency. Each frequency of NR and E-UTRAN might have a
        specific threshold.";
      reference "ThreshX, HighQ in 3GPP TS 38.304";
      mandatory true;
      type int32 { range "0..31"; }
      units dB;
    }

    leaf threshXLowP {
      description "Specifies the Srxlev threshold used by the UE when
        reselecting towards a lower priority RAT/frequency than the current
        serving frequency. Each frequency of NR and E-UTRAN might have a
        specific threshold. Resolution is 2.";
      reference "ThreshX, LowP in 3GPP TS 38.304";
      mandatory true;
      type int32 { range "0..62"; }
      units dB;
    }

    leaf threshXLowQ {
      description "Specifies the Squal threshold used by the UE when
        reselecting towards a lower priority RAT/frequency than the current
        serving frequency. Each frequency of NR and E-UTRAN might have a
        specific threshold.";
      reference "ThreshX, LowQ in 3GPP TS 38.304";
      mandatory true;
      type int32 { range "0..31"; }
      units dB;
    }
```

```
    leaf tReselectionNR {
      description "Cell reselection timer for NR.";
      reference "TreselectionRAT for NR in 3GPP TS 38.331";
      mandatory true;
      type int32 { range "0..7"; }
      units s;
    }

    leaf tReselectionNRSfHigh {
      description "The attribute tReselectionNr (parameter TreselectionNR in
        3GPP TS 38.304) is multiplied with this scaling factor if the UE is
        in high mobility state.";
      reference "Speed dependent ScalingFactor for TreselectionNR for high
        mobility state in 3GPP TS 38.304";
      mandatory true;
      type uint8 { range "25 | 50 | 75 | 100"; }
      units %;
    }

    leaf tReselectionNRSfMedium {
      description "The attribute tReselectionNr (parameter TreselectionNR in
        3GPP TS 38.304) multiplied with this scaling factor if the UE is in
        medium mobility state.";
      reference "Speed dependent ScalingFactor for TreselectionNR for medium
        mobility state in 3GPP TS 38.304";
      mandatory true;
      type uint8 { range "25 | 50 | 75 | 100"; }
      units %;
    }

    leaf nRFrequencyRef {
      description "Reference to a corresponding NRFrequency instance.";
      mandatory true;
      type types3gpp:DistinguishedName;
    }
  }

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

    list NRFreqRelation {
      description "Together with the target NRFrequency, it represents the
        frequency properties applicable to the referencing NRFreqRelation.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses NRFreqRelationGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

E.5.23 module _3gpp-nr-nrm-nrfrequency@2019-10-28.yang

```
module _3gpp-nr-nrm-nrfrequency {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-nrnetwork-nrfrequency";
  prefix "nrfreq3gpp";

  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-nr-nrm-nrnetwork { prefix nrnet3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the NRFrequency Information Object
    Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping NRFrequencyGrp {
    description "Represents the NRFrequency IOC.";
```

```
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf absoluteFrequencySSB {
      description "The absolute frequency applicable for a downlink NR carrier
        frequency associated with the SSB, in terms of NR-ARFCN.";
      mandatory true;
      type uint32 { range "0.. 3279165"; }
    }

    leaf sSBSubCarrierSpacing {
      description "Sub-carrier spacing of the SSB.";
      mandatory true;
      type uint8 { range "15 | 30 | 60 | 120"; }
      units "kHz";
    }

    leaf-list multiFrequencyBandListNR {
      description "List of additional frequency bands the frequency belongs to.
        The list is automatically set by the gNB.";
      config false;
      min-elements 0;
      type uint16 { range "1..256"; }
    }
  }

  grouping NRFrequencyWrapper {
    list NRFrequency {
      description "Represents certain NR frequency properties.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses NRFrequencyGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    if-feature subnet3gpp:ExternalsUnderSubNetwork ;
    uses NRFrequencyWrapper;
  }

  augment "/nrnet3gpp:NRNetwork" {
    if-feature nrnet3gpp:ExternalsUnderNRNetwork;
    uses NRFrequencyWrapper;
  }
}
```

E.5.24 module _3gpp-nr-nrm-nrnetwork@2019-06-17.yang

```
module _3gpp-nr-nrm-nrnetwork {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-nrnetwork";
  prefix "nrnet3gpp";

  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  description "Defines the YANG mapping of the NRNetwork Information Object
    Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

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

  feature ExternalsUnderNRNetwork {
    description "Classes representing external entities like NRFrequency,
      ExternalGNBCUCPFunction, ExternalGNBDUFunction
      are contained under a NRNetwork list/class.";
  }

  grouping NRNetworkGrp {
    description "Represents the NRNetwork IOC.";
```

```
    reference "3GPP TS 28.541";
    uses subnet3gpp:SubNetworkGrp;
  }

  list NRNetwork {
    description "A subnetwork containing gNB external NR entities.";
      reference "3GPP TS 28.541";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
      uses NRNetworkGrp;
    }
  }
}
```

E.5.25 module _3gpp-nr-nrm-nrsectorcarrier.yang

```
module _3gpp-nr-nrm-nrsectorcarrier {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-nrnetwork-nrsectorcarrier";
  prefix "nrsectcarr3gpp";

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-managed-function { prefix mf3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the NRSectorCarrier Information
    Object Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2020-05-28 { reference CR-0316 ; }
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-17 {
    description "Initial revision";
  }

  grouping NRSectorCarrierGrp {
    description "Represents the NRSectorCarrier IOC.";
    reference "3GPP TS 28.541";
    uses mf3gpp:ManagedFunctionGrp;

    leaf txDirection {
      description "Indicates if the transmission direction is downlink,
        uplink, or both downlink and uplink.";
      mandatory true;
      type types3gpp:TxDirection;
    }

    leaf configuredMaxTxPower {
      description "Maximum transmisssion power at the antenna port for all
        downlink channels, used simultaneously in a cell, added together.
        Condition:  The sector-carrier has a downlink and the
        configuration of Tx power at antenna port reference point is supported.";
      mandatory true;
      type int32;
      units mW;
    }

    leaf configuredMaxTxEIRP {
      type int64;
      units dBm;
      mandatory true;
      description "The maximum emitted isotroptic radiated power (EIRP) in dBm
        for all downlink channels, used simultaneously in a cell, added together.
        Condition: the sector-carrier has a downlink and the
        configuration of emitted isotropic radiated power is supported";
    }

    leaf arfcnDL {
      description "NR Absolute Radio Frequency Channel Number (NR-ARFCN)
        for downlink.
        Condition:  The sector-carrier has a downlink AND the value
        differs from the referring cell's value of arfcnDL.";
```

```
      reference "3GPP TS 38.104";
      mandatory true;
      type int32 { range "0..3279165"; }
    }

    leaf arfcnUL {
      description "NR Absolute Radio Frequency Channel Number (NR-ARFCN)
        for uplink.
        Condition: The sector-carrier has an uplink AND the value
        differs from the referring cell's value of arfcnUL.";
      reference "3GPP TS 38.104";
      mandatory true;
      type int32 { range "0..3279165"; }
    }

    leaf bSChannelBwDL {
      description "Base station channel bandwitdth for downlink.
        Condition: The sector-carrier has a downlink AND the value
        differs from the referring cell's value of bSChannelBwDL.";
      reference "3GPP TS 38.104";
      mandatory true;
      type int32 { range "5 | 10 | 15 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
        90 | 100"; }
      units MHz;
    }

    leaf bSChannelBwUL {
      description "Base station channel bandwitdth for uplink.";
      reference "3GPP TS 38.104";
      mandatory true;
      type int32 { range "5 | 10 | 15 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
        90 | 100"; }
      units MHz;
    }

    leaf sectorEquipmentFunctionRef {
      description "Reference to corresponding SectorEquipmentFunction
        instance.";
      reference "3GPP TS 23.622";
      mandatory true;
      type types3gpp:DistinguishedName;
    }
  }

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

    list NRSectorCarrier {
      description "Represents the resources of each transmission point
        included in the cell.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses NRSectorCarrierGrp;
      }
      uses mf3gpp:ManagedFunctionContainedClasses;
    }
  }
}
```

E.5.26 module _3gpp-nr-nrm-rrmpolicy.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-rrmpolicy {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-rrmpolicy";
  prefix "nrrrmpolicy3gpp";

  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp ; }
  import _3gpp-nr-nrm-nrcelldu { prefix nrcelldu3gpp ; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp ; }
  import _3gpp-nr-nrm-gnbcuupfunction { prefix gnbcuup3gpp ; }
```

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

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the RRMPolicy abstract class that
    is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2022-07-27 { reference "CR-0769"; }
  revision 2020-11-05 { reference CR-0412 ; }
  revision 2020-04-28 { reference "CR0285"; }
  revision 2020-02-14 { reference "Initial revision"; }

  grouping rRMPolicyMemberGrp {
    description "This data type represents an RRM Policy member that will be
      part of a rRMPolicyMemberList. A RRMPolicyMember is defined by its
      pLMNId and sNSSAI (S-NSSAI).
      The members in a rRMPolicyMemberList are assigned a specific amount of
      RRM resources based on settings in RRMPolicy.";

    uses types5g3gpp:PLMNInfo;
  }

  grouping RRMPolicy_Grp {
    description "This IOC represents the properties of an abstract RRMPolicy
      . The RRMPolicy_ IOC needs to be subclassed to be instantiated.
      It defines two attributes apart from those inherited from Top IOC, the
      resourceType attribute defines type of resource (PRB, RRC
      connected users, DRB usage etc.) and the rRMPolicyMemberList attribute
      defines the RRMPolicyMember(s)that are subject to this policy.
      An RRM resource (defined in resourceType
      attribute) is located in NRCellDU, NRCellCU, GNBDUFunction,
      GNBCUCPFunction or in GNBCUUPFunction. The RRMPolicyRatio IOC is one
      realization of a RRMPolicy_ IOC. This RRM framework allows adding new
      policies, both standardized (like RRMPolicyRatio) or as vendor specific,
      by inheriting from the abstract RRMPolicy_ IOC.";

    leaf resourceType {
      description "The resourceType attribute defines type of resource (PRB,
        RRC connected users, DRB usage etc.) that is subject to policy.
       Valid values are 'PRB', 'PRB_UL' , 'PRB_DL','RRC' or 'DRB'";
      mandatory true;
      type enumeration {
        enum PRB;
        enum PRB_UL;
        enum PRB_DL;
        enum RRC;
        enum DRB;
      }
    }

    list rRMPolicyMemberList{
      description "It represents the list of RRMPolicyMember (s) that the
        managed object is supporting. A RRMPolicyMember <<dataType>> include
        the PLMNId <<dataType>> and S-NSSAI <<dataType>>." ;
      min-elements 1;
      key "mcc mnc sd sst";
      uses rRMPolicyMemberGrp;
    }
  } // grouping

  grouping RRMPolicyRatioGrp {
    description "Represents the RRMPolicyRatio concrete IOC.";

    uses RRMPolicy_Grp;    // Inherits RRMPolicy_

    leaf rRMPolicyMaxRatio {
      description " This attribute specifies the maximum percentage of radio
       resource that can be used by the associated rRMPolicyMemberList.
       The maximum percentage of radio resource include at least one of
       the shared resources, prioritized resources and dedicated resources.
       The sum of the rRMPolicyMaxRatio values assigned to all RRMPolicyRatio(s)
       name-contained by same ManagedEntity can be greater that 100.";
      default 100;
      type uint8 { range "0..100"; }
      units percent;
    }
```

```
    leaf rRMPolicyMinRatio {
      description " This attribute specifies the minimum percentage of radio
        resources that can be used by the associated rRMPolicyMemberList.
        The minimum percentage of radio resources including at least one of
        prioritized resources and dedicated resources. The sum of the
        rRMPolicyMinRatio values assigned to all RRM PolicyRatio(s)
        name-contained by same ManagedEntity shall be less or equal 100.";
      default 0;
      type uint8 { range "0..100"; }
      units percent;
    }

    leaf rRMPolicyDedicatedRatio {
      description " This attribute specifies the percentage of radio resource
        that dedicatedly used by the associated rRMPolicyMemberList. The sum of
        the rRMPolicyDeidctaedRatio values assigned to all RRMPolicyRatio(s)
        name-contained by same ManagedEntity shall be less or equal 100. ";
      default 0;
      type uint8 { range "0..100"; }
      units percent;
      }
    }

  grouping RrmPolicySubtree {
    description "Contains RrmPolicy related classes.
      Should be used in all classes (or classes inheriting from)
      - NRCellCU, NRCellDU, GNBCUUPFunction, GNBCUCPFunction, GNBDUFunction

      If some YAM wants to augment these classes/list/groupings they must
      augment all user classes!";

    list RRMPolicyRatio {
      description "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).

        Structure of RRMPolicyRatio includes in order: Dedicated Resources,
        Prioritized Resources, Shared Resources, etc.

        - 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].";
```

```
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses RRMPolicyRatioGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/" +
      "nrcellcu3gpp:NRCellCU" {
    uses RrmPolicySubtree;
  }

  augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction/" +
      "nrcelldu3gpp:NRCellDU" {
    uses RrmPolicySubtree;
  }

  augment "/me3gpp:ManagedElement/gnbcuup3gpp:GNBCUUPFunction" {
    uses RrmPolicySubtree;
  }

  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction" {
    uses RrmPolicySubtree;
  }

  augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction" {
    uses RrmPolicySubtree;
  }
}
<CODE ENDS>
```

E.5.27 Void

E.5.28 module _3gpp-nr-nrm-danrmanagementfunction.yang

```
module _3gpp-nr-nrm-danrmanagementfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-danrmanagementfunction";
  prefix "danrmanagementfunction3gpp";


  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }



  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the DANRManagementFunction Information Object Class
    (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2020-05-08 { reference S5-203316; }


  grouping DANRManagementFunctionGrp {
    description "Represents the DANRManagementFunction IOC.";
    reference "3GPP TS 28.541";
    uses top3gpp:Top_Grp;

    leaf intrasystemANRManagementSwitch {
        description "This attribute determines whether the intra-system ANR function is activated or
deactivated.";
         type boolean;
    }

    leaf intersystemANRManagementSwitch {
        description "This attribute determines whether the inter-system ANR function is activated or
deactivated.";
        type boolean;
```

```
    }


  }

  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction" {
    if-feature gnbcucp3gpp:DANRManagementFunction;
    uses DANRManagementFunctionGrp;
  }
}
```

E.5.29 module _3gpp-nr-nrm-desmanagementfunction.yang

```
module _3gpp-nr-nrm-desmanagementfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-desmanagementfunction";
  prefix "desmf3gpp";

  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-5g-common-yang-types { prefix type5g3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the DESManagementFunction
    Information Object Class (IOC) that is part of the NR Network Resource
    Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2021-08-05 { reference S5-214053/CR-0518; }
  revision 2020-05-08 { reference S5-203316; }

  grouping loadTimeThresholdGrp {
    description "Represents the the traffic load threshold and the time
      duration.";

    leaf loadThreshold {
      description "This attribute is used by distributed ES algorithms to allow
        a cell to enter the energySaving state.";
      type type5g3gpp:EnergySavingLoadThresholdT;
    }
    leaf timeDuration {
      description "The time duration indicates how long the traffic load
        (either for UL or DL) in the cell needs to have been above the
        threshold to wake up one or more original cells which have been
        provided backup coverage by the candidate cell.";
      type type5g3gpp:EnergySavingTimeDurationT;
    }
  }

  grouping DESManagementFunctionGrp {
    description "Represents the DESManagementFunction IOC.";

    leaf desSwitch {
      description "This attribute determines whether the Distributed SON
        energy saving function is enabled or disabled.";
      type boolean;
    }

    list intraRatEsActivationOriginalCellLoadParameters {
      description "This attributes is relevant, if the cell acts as an original
        cell. This attribute indicates the traffic load threshold and the time
        duration, which are used by distributed ES algorithms to allow a cell
        to enter the energySaving state.";
      key loadThreshold;
      min-elements 1;
      max-elements 1;
      uses loadTimeThresholdGrp;
    }

    list intraRatEsActivationCandidateCellsLoadParameters {
      description "This attribute indicates the traffic load threshold and the
        time duration, which are used by distributed ES algorithms level to
```

```
        allow an 'original' cell to enter the energySaving state.";
      key loadThreshold;
      min-elements 1;
      max-elements 1;
      uses loadTimeThresholdGrp;
    }

    list intraRatEsDeactivationCandidateCellsLoadParameters {
      description "This attributes is relevant, if the cell acts as a candidate
        cell.This attribute indicates the traffic load threshold  and the time
        duration which is used by distributed ES algorithms to allow a cell to
        leave the energySaving state.";
      key loadThreshold;
      min-elements 1;
      max-elements 1;
      uses loadTimeThresholdGrp;
    }

    list esNotAllowedTimePeriod {
      description "This is a list of time periods during which
        inter-RAT energy saving is not allowed";
      key idx;

      leaf idx {
        type uint32;
      }
      uses EsNotAllowedTimePeriodGrp;
    }

    list interRatEsActivationOriginalCellParameters {
      description "This attribute indicates the traffic load threshold and the
        time duration, which are used by distributed inter-RAT ES algorithms to
        allow an original cell to enter the energySaving state.";
      key loadThreshold;
      min-elements 1;
      max-elements 1;
      uses loadTimeThresholdGrp;
    }

    list interRatEsActivationCandidateCellParameters {
      description "This attribute indicates the traffic load threshold and the
        time duration, which are used by distributed inter-RAT ES algorithms to
        allow an original cell to enter the energySaving state.";
      key loadThreshold;
      min-elements 1;
      max-elements 1;
      uses loadTimeThresholdGrp;
    }

    list interRatEsDeactivationCandidateCellParameters {
      description "This attribute indicates the traffic load threshold and the
        time duration which is used by distributed inter-RAT ES algorithms to
        allow an original cell to leave the energySaving state.";
      key loadThreshold;
      min-elements 1;
      max-elements 1;
      uses loadTimeThresholdGrp;
    }

    leaf energySavingState {
      description "Specifies the status regarding the energy saving in the
        cell.";
      type enumeration {
        enum isNotEnergySaving;
        enum isEnergySaving;
      }
    }

    leaf isProbingCapable {
      description "This attribute indicates whether this cell is capable of
        performing the ES probing procedure.";
      type enumeration{
        enum yes;
        enum no;
      }
    }
  }
```

```
  grouping EsNotAllowedTimePeriodGrp {
    leaf startTime {
      description "Start of not allowed time period in UTC time zone.
        If set, the endTime must also be set. If not set, this is
        interpreted as around the clock.";
      must ../endTime;
      type type5g3gpp:UTC24TimeOfDayT;
    }
    leaf endTime {
      description "If endTime has a lower value than startTime, it will
        be interpreted as referring to the following day.";
      type type5g3gpp:UTC24TimeOfDayT;
      must ../startTime;
    }
    leaf-list daysOfWeek {
      description "Specifies that the not allowed periods are only
        applicable to the specified days in UTC timezone. Every day if
        not set.";
      type type5g3gpp:DayOfWeekT;
    }
  }

  grouping DESManagementFunctionSubtree {
    list DESManagementFunction {
      description "This IOC represents the management capabilities of
        Distributed SON Energy Saving (ES) functions. This is provided for
        Energy Saving purposes.

        In the case where multiple DESManagement MOIs exist at different
        levels of the containment tree, the DESManagement MOI at the lower
        level overrides the DESManagement MOIs at higher level(s) of the same
        containment tree.";
      reference "clause 6.2.3.0 in TS 28.310";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses DESManagementFunctionGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/"+
      "nrcellcu3gpp:NRCellCU" {
    if-feature nrcellcu3gpp:DESManagementFunction;
    uses DESManagementFunctionSubtree;
  }
  augment /me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction {
    if-feature gnbcucp3gpp:DESManagementFunction;
    uses DESManagementFunctionSubtree;
  }
  augment /me3gpp:ManagedElement {
    if-feature me3gpp:DESManagementFunction;
    uses DESManagementFunctionSubtree;
  }
  augment /subnet3gpp:SubNetwork {
    if-feature subnet3gpp:DESManagementFunction;
    uses DESManagementFunctionSubtree;
  }
}
```

E.5.30 module _3gpp-nr-nrm-drachoptimizationfunction.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-drachoptimizationfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-drachoptimizationfunction";
  prefix "dracho3gpp";

  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-nr-nrm-nrcelldu { prefix nrcelldu3gpp; }
  import _3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the DRACHOptimizationFunction
```

```
    Information Object Class (IOC) that is part of the NR Network Resource
    Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2021-08-05 { reference S5-214053/CR-0518; }
  revision 2021-01-25 { reference CR-0454 ; }
  revision 2020-10-02 { reference "CR-0384, CR-0382" ; }
  revision 2020-05-08 { reference S5-203316; }

  typedef TargetProbabilityT {
    type enumeration {
      enum 25;
      enum 50;
      enum 75;
      enum 90;
    }
  }
  typedef NumberofpreamblessentT {
    type uint32 {
      range "1..200";
    }
  }
  typedef AccessdelayT {
    type uint32 {
      range "10..560";
    }
  }
  grouping NumPreableAccessDelayGrp {
    description "Represents the target Access Probability (APn) for the RACH
      optimization function.";

    leaf targetProbability {
      description "This attribute determines the target Probability.";
      mandatory true;
      type TargetProbabilityT;
    }
    leaf numberofpreamblessent {
      description "This attribute determines the number of preambles sent.";
      mandatory true;
      type NumberofpreamblessentT;
    }
  }

  grouping DRACHOptimizationFunctionGrp {
    description "Represents the DRACHOptimizationFunction IOC.";

    list ueAccProbilityDist {
      description "This is a list of target Access Probability (APn) for the
        RACH optimization function.";
      key "targetProbability numberofpreamblessent";
      uses NumPreableAccessDelayGrp;
    }
    list ueAccDelayProbilityDist {
      description "This is a list of target Access Delay probability (ADP)
        for the RACH optimization function.";
      key "targetProbability numberofpreamblessent";
      uses NumPreableAccessDelayGrp;
    }
    leaf drachOptimizationControl {
      description "This attribute determines whether the RACH Optimization
        function is enabled or disabled.";
      type boolean;
    }
  }

  grouping DRACHOptimizationFunctionSubtree {
    list DRACHOptimizationFunction {
      description "This IOC represents the management capabilities of
        Centralized SON Energy Saving (ES) functions. This is provided for
        Energy Saving purposes.

        In the case where multiple CESManagement MOIs exist at different
        levels of the containment tree, the CESManagement MOI at the lower
        level overrides the CESManagement MOIs at higher level(s) of the
        same containment tree.";
      reference "clause 6.2.2 in TS 28.310";
      key id;
      uses top3gpp:Top_Grp;
```

```
      container attributes {
        uses DRACHOptimizationFunctionGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction/"+
      "nrcelldu3gpp:NRCellDU" {
    if-feature nrcelldu3gpp:DRACHOptimizationFunction;
    uses DRACHOptimizationFunctionSubtree;
  }
  augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction" {
    if-feature gnbdu3gpp:DRACHOptimizationFunction;
    uses DRACHOptimizationFunctionSubtree;
  }
  augment "/me3gpp:ManagedElement" {
    if-feature me3gpp:DRACHOptimizationFunction;
    uses DRACHOptimizationFunctionSubtree;
  }
  augment "/subnet3gpp:SubNetwork" {
    if-feature nrcelldu3gpp:DRACHOptimizationFunction;
    uses DRACHOptimizationFunctionSubtree;
  }
}
<CODE ENDS>
```

E.5.31 module _3gpp-nr-nrm-dmrofunction.yang

```
module _3gpp-nr-nrm-dmrofunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-dmrofunction";
  prefix "dmrof3gpp";

  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the DMROFunction
    Information Object Class (IOC) that is part of the NR Network Resource
    Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2022-01-07 { reference CR-0633; }
  revision 2021-08-05 { reference S5-214053/CR-0518; }
  revision 2020-05-08 { reference S5-203316; }

  grouping DMROFunctionGrp {
    description "Represents the DMROFunction IOC.";


    leaf maximumDeviationHoTriggerLow {
      description "This parameter defines the maximum allowed lower
        deviation of the Handover Trigger, from the default point of
        operation.";
      type int32 {range "-20..20";}
      units "0.5 dB";
    }

    leaf maximumDeviationHoTriggerHigh {
      description "This parameter defines the maximum allowed upper
        deviation of the Handover Trigger, from the default point of
        operation.";
      type int32 {range "-20..20";}
      units "0.5 dB";
    }

    leaf minimumTimeBetweenHoTriggerChange {
      description "This parameter defines the minimum allowed time interval
        between two Handover Trigger change performed by MRO. This is used to
        control the stability and convergence of the algorithm.";
      type uint32 {
        range 0..604800; // <= 1 week
      }
```

```
      units seconds;
    }
    leaf tstoreUEcntxt {
      description "The timer used for detection of too early HO, too late HO
        and HO to wrong cell.";
      type uint32 {
        range 0..1023;
      }
      units "100 milliseconds";
    }
    leaf dmroControl {
      description "This attribute determines whether the MRO function is
        enabled or disabled.";
      type boolean;
    }
  }

  grouping DMROFunctionSubtree {
    list DMROFunction {
      description "This IOC contains attributes to support the D-SON function
        of MRO.

        In the case where multiple DMRO MOIs exist at different levels of the
        containment tree, the DMRO MOI at the lower level overrides the DMRO
        MOIs at higher level(s) of the same containment tree.";
      reference "clause 7.1.2 in TS 28.313";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses DMROFunctionGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/"+
      "nrcellcu3gpp:NRCellCU" {
    if-feature nrcellcu3gpp:DMROFunction;
    uses DMROFunctionSubtree;
  }
  augment /me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction {
    if-feature gnbcucp3gpp:DMROFunction;
    uses DMROFunctionSubtree;
  }
  augment /me3gpp:ManagedElement {
    if-feature me3gpp:DMROFunction;
    uses DMROFunctionSubtree;
  }
  augment /subnet3gpp:SubNetwork {
    if-feature subnet3gpp:DMROFunction;
    uses DMROFunctionSubtree;
  }
}
```

E.5.32 module _3gpp-nr-nrm-dpciconfigurationfunction.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-dpciconfigurationfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-dpciconfigurationfunction";
  prefix "dpcicf3gpp";

  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-5g-common-yang-types { prefix type5g3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the DPCIConfigurationFunction
    Information Object Class (IOC) that is part of the NR Network Resource
    Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2021-08-05 { reference S5-214053/CR-0518; }
  revision 2021-01-25 { reference CR-0454 ; }
```

```
  revision 2020-11-25 { reference CR-0386 ; }
  revision 2020-05-08 { reference S5-203316; }

  grouping DPCIConfigurationFunctionGrp {
    description "Represents the DPCICONFIGURATIONFunction IOC.";

    list nRPciList {
      description "This holds a list of physical cell identities that can be
        assigned to the NR cells. This attribute shall be supported if D-SON
        PCI configuration function is supported.";
      key NRPci;
      leaf NRPci {
        type type5g3gpp:PhysCellID;
      }
    }

    leaf dPciConfigurationControl {
      description "This attribute determines whether the Distributed SON PCI
        configuration Function is enabled or disabled.";
      type boolean;
    }
  }

  grouping DPCIConfigurationFunctionSubtree {
    list DPCIConfigurationFunction {
      description "This IOC contains attributes to support the Distributed SON
        function of PCI configuration.

        In the case where multiple DPCIConfiguration MOIs exist at different
        levels of the containment tree, the DPCIConfiguration MOI at the lower
        level overrides the DPCIConfiguration MOIs at higher level(s) of the
        same containment tree.";
      reference "clause 7.1.3 in TS 28.313";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses DPCIConfigurationFunctionGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/"+
      "nrcellcu3gpp:NRCellCU" {
    if-feature nrcellcu3gpp:DPCIConfigurationFunction;
    uses DPCIConfigurationFunctionSubtree;
  }
  augment /me3gpp:ManagedElement {
    if-feature me3gpp:DPCIConfigurationFunction;
    uses DPCIConfigurationFunctionSubtree;
  }
  augment /subnet3gpp:SubNetwork {
    if-feature subnet3gpp:DPCIConfigurationFunction;
    uses DPCIConfigurationFunctionSubtree;
  }
}
<CODE ENDS>
```

E.5.33 module _3gpp-nr-nrm-cpciconfigurationfunction.yang

```
module _3gpp-nr-nrm-cpciconfigurationfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-cpciconfigurationfunction";
  prefix "cpcicf3gpp";

  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-nrcelldu { prefix nrcelldu3gpp; }
  import _3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Represents the CPCIConfigurationFunction Information Object
    Class(IOC) that is part of the NR Network Resource Model.";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2021-08-05 { reference S5-214053/CR-0518; }
```

```
  revision 2020-05-08 { reference S5-203316; }

  grouping CPCIConfigurationFunctionGrp {
    description "Represents the CPCIConfigurationFunction IOC.";

    leaf cPciConfigurationControl {
        description "This attribute determines whether the Centralized SON
          PCI configuration function is enabled or disabled.";
        type boolean;
        mandatory true;
    }

    leaf-list cSonPciList {
      type int32 { range "0..1007"; }
      min-elements 1;
      description "Holds a list of physical cell identities that can be
        assigned to the pci attribute by gNB. The assignment algorithm is not
        specified.
        See TS 38.211 clause 7.4.2.1 for legal values of pci.
        This attribute shall be supported if and only if the C-SON PCI
        configuration is supported.";
      reference "See TS 38.211 clause 7.4.2.1";
    }
  }

  grouping CPCIConfigurationFunctionSubtree {
    list CPCIConfigurationFunction {
      description "This IOC contains attributes to support the Cross
        Domain-Centralized SON function of PCI configuration

        In the case where multiple CPCIConfiguration MOIs exist at different
        levels of the containment tree, the CPCIConfiguration MOI at the lower
        level overrides the CPCIConfiguration MOIs at higher level(s) of the
        same containment tree.";
      reference "clause 7.2.1 in TS 28.313";
      key id;
      uses top3gpp:Top_Grp ;
      container attributes {
        uses CPCIConfigurationFunctionGrp ;
      }
    }
  }

  augment /me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction/nrcelldu3gpp:NRCellDU {
    if-feature nrcelldu3gpp:CPCIConfigurationFunction;
    uses CPCIConfigurationFunctionSubtree;
  }
  augment /me3gpp:ManagedElement {
    if-feature me3gpp:CPCIConfigurationFunction;
    uses CPCIConfigurationFunctionSubtree;
  }
  augment /subnet3gpp:SubNetwork {
    if-feature subnet3gpp:CPCIConfigurationFunction;
    uses CPCIConfigurationFunctionSubtree;
  }
}
```

E.5.34 module _3gpp-nr-nrm-cesmanagementfunction.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-cesmanagementfunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-cesmanagementfunction";
  prefix "cesmf3gpp";

  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-5g-common-yang-types { prefix type5g3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the CESManagementFunction
    Information Object Class (IOC) that is part of the NR Network Resource Model
    (NRM).";
```

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

  revision 2021-08-05 { reference S5-214053/CR-0518; }
  revision 2020-05-08 { reference S5-203316; }

  grouping loadTimeThresholdGrp {
    description "Represents the the traffic load threshold and the time
      duration.";

    leaf loadThreshold {
      description "This attribute is used by distributed ES algorithms to allow
        a cell to enter the energySaving state.";
      type type5g3gpp:EnergySavingLoadThresholdT;
    }
    leaf timeDuration {
      description "The time duration indicates how long the traffic load
        (either for UL or DL) in the cell needs to have been above the
        threshold to wake up one or more original cells which have been
        provided backup coverage by the candidate cell.";
      type type5g3gpp:EnergySavingLoadThresholdT;
    }
  }
  grouping CESManagementFunctionGrp {
    description "Represents the CESManagementFunction IOC.";

    leaf cesSwitch {
      description "This attribute determines whether the Centralized SON energy
        saving function is enabled or disabled.";
      type boolean;
      default true;
    }
    list intraRatEsActivationOriginalCellLoadParameters {
      description "This attributes is relevant, if the cell acts as an original
        cell.This attribute indicates the traffic load threshold and the time
        duration, which are used by distributed ES algorithms to allow a cell
        to enter the energySaving state. The time duration indicates how long
        the load needs to have been below the threshold.";
      key loadThreshold;
      min-elements 1;
      max-elements 1;
      uses loadTimeThresholdGrp;
    }

    list intraRatEsActivationCandidateCellsLoadParameters {
      description "This attributes is relevant, if the cell acts as a candidate
        cell. This attribute indicates the traffic load threshold and the time
        duration, which are used by distributed ES algorithms level to allow an
        'original' cell to enter the energySaving state. Threshold and duration
        are applied to the candidate cell(s) which will provides coverage
        backup of an original cell when it is in the energySaving state. The
        threshold applies in the same way for a candidate cell, no matter for
        which original cell it will provide backup coverage.
        The time duration indicates how long the traffic in the candidate cell
        needs to have been below the threshold before any original cells which
        will be provided backup coverage by the candidate cell enters energy
        saving state.";
      key loadThreshold;
      min-elements 1;
      max-elements 1;
      uses loadTimeThresholdGrp;
    }

    list intraRatEsDeactivationCandidateCellsLoadParameters {
      description "This attributes is relevant, if the cell acts as a candidate
        cell. This attribute indicates the traffic load threshold and the time
        duration which is used by distributed ES algorithms to allow a cell to
        leave the energySaving state. Threshold and time duration are applied
        to the candidate cell when it which provides coverage backup for the
        cell in energySaving state. The threshold applies in the same way for a
        candidate cell, no matter for which original cell it provides backup
        coverage.
        The time duration indicates how long the traffic in the candidate cell
        needs to have been above the threshold to wake up one or more original
        cells which have been provided backup coverage by the candidate cell.";
      key loadThreshold;
      min-elements 1;
      max-elements 1;
      uses loadTimeThresholdGrp;
```

```
    }

    list esNotAllowedTimePeriod {
      description "This is a list of time periods during which
        inter-RAT energy saving is not allowed";
      key idx;

      leaf idx {
        type uint32;
      }
      uses EsNotAllowedTimePeriodGrp;
    }

    list interRatEsActivationOriginalCellParameters {
      description "This attribute is relevant, if the cell acts as an original
        cell. This attribute indicates the traffic load threshold and the time
        duration, which are used by distributed inter-RAT ES algorithms to
        allow an original cell to enter the energySaving state. The time
        duration indicates how long the traffic load (both for UL and DL) needs
        to have been below the threshold.

        In case the original cell is an EUTRAN cell,  the load information
        refers to Composite Available Capacity Group IE (see 3GPP TS 36.413
        [12] Annex B.1.5) and the following applies:
        Load = (100 - 'Capacity Value' ) * 'Cell Capacity Class Value',
        where 'Capacity Value' and 'Cell Capacity Class Value' are defined in
        3GPP TS 36.423 [7].

        In case the original cell is a UTRAN cell, the load information refers
        to Cell Load Information Group IE (see 3GPP TS 36.413 [12] Annex B.1.5)
        and the following applies:
        Load= 'Load Value'  * 'Cell Capacity Class Value', where 'Load Value'
        and 'Cell Capacity Class Value' are defined in 3GPP TS 25.413 [19].

        If the 'Cell Capacity Class Value' is not known, then 'Cell Capacity
        Class Value' should be set to 1 when calculating the load, and the load
        threshold should be set in range of 0..100.";
      key loadThreshold;
      min-elements 1;
      max-elements 1;
      uses loadTimeThresholdGrp;
    }

    list interRatEsActivationCandidateCellParameters {
      description "This attribute is relevant, if the cell acts as a candidate
        cell. This attribute indicates the traffic load threshold and the time
        duration, which are used by distributed inter-RAT ES algorithms to
        allow an original cell to enter the energySaving state. Threshold and
        time duration are applied to the candidate cell(s) which will provides
        coverage backup of an original cell when it is in the energySaving
        state. The time duration indicates how long the traffic load (both for
        UL and DL) in the candidate cell needs to have been below the threshold
        before any original cells which will be provided backup coverage by the
        candidate cell enters energySaving state.

        In case the candidate cell is a UTRAN or GERAN cell, the load
        information refers to Cell Load Information Group IE (see 3GPP TS
        36.413 [12] Annex B.1.5) and the following applies:
        Load= 'Load Value'  * 'Cell Capacity Class Value', where 'Load Value'
        and 'Cell Capacity Class Value' are defined in 3GPP TS 25.413 [19]
        (for UTRAN) / TS 48.008 [20] (for GERAN).

        If the 'Cell Capacity Class Value' is not known, then 'Cell Capacity
        Class Value' should be set to 1 when calculating the load, and the load
        threshold should be set in range of 0..100.";
      min-elements 1;
      max-elements 1;
      key loadThreshold;
      uses loadTimeThresholdGrp;
    }

    list interRatEsDeactivationCandidateCellParameters {
      description "This attribute is relevant, if the cell acts as a candidate
        cell. This attribute indicates the traffic load threshold and the time
        duration which is used by distributed inter-RAT ES algorithms to allow
        an original cell to leave the energySaving state. Threshold and time
        duration are applied to the candidate cell which provides coverage
        backup for the cell in energySaving state.
```

```
        The time duration indicates how long the traffic load (either for UL or
        DL) in the candidate cell needs to have been above the threshold to
        wake up one or more original cells which have been provided backup
        coverage by the candidate cell.

        For the load see the definition of
        interRatEsActivationCandidateCellParameters.

        This attribute indicates the traffic load threshold and the time
        duration which is used by distributed inter-RAT ES algorithms to allow
        an original cell to leave the energySaving state.";
      key loadThreshold;
      min-elements 1;
      max-elements 1;
      uses loadTimeThresholdGrp;
    }

    leaf energySavingState {
      description "Specifies the status regarding the energy saving in the
        cell. If the value of energySavingControl is toBeEnergySaving, then it
        shall be tried to achieve the value isEnergySaving for the
        energySavingState. If the value of energySavingControl is
        toBeNotEnergySaving, then it shall be tried to achieve the value
        isNotEnergySaving for the energySavingState. ";
      type enumeration{
        enum isNotEnergySaving;
        enum isEnergySaving;
      }
    }

    leaf energySavingControl {
      description "This attribute allows the Cross Domain-Centralized SON
        energy saving function to initiate energy saving activation or
        deactivation.";
      type enumeration{
        enum toBeEnergySaving;
        enum toBeNotEnergySaving;
      }
    }
  }

  grouping EsNotAllowedTimePeriodGrp {
    leaf startTime {
      description "Start of not allowed time period in UTC time zone.
        If set, the endTime must also be set. If not set, this is
        interpreted as around the clock.";
      must ../endTime;
      type type5g3gpp:UTC24TimeOfDayT;
    }
    leaf endTime {
      description "If endTime has a lower value than startTime, it will
        be interpreted as referring to the following day.";
      must ../startTime;
      type type5g3gpp:UTC24TimeOfDayT;
    }
    leaf-list daysOfWeek {
      description "Specifies that the not allowed periods are only
        applicable to the specified days in UTC timezone. Every day if
        not set.";
      type type5g3gpp:DayOfWeekT;
    }
  }

  grouping CESManagementFunctionSubtree {
    list CESManagementFunction {
      description "This IOC represents the management capabilities of
        Centralized SON Energy Saving (ES) functions. This is provided for
        Energy Saving purposes.

        In the case where multiple CESManagement MOIs exist at different
        levels of the containment tree, the CESManagement MOI at the lower
        level overrides the CESManagement MOIs at higher level(s) of the
        same containment tree.";
      reference "clause 6.2.2 in TS 28.310";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses CESManagementFunctionGrp;
```

```
      }
    }
  }

  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/"+
      "nrcellcu3gpp:NRCellCU" {
    if-feature nrcellcu3gpp:CESManagementFunction;
    uses CESManagementFunctionSubtree;
  }
  augment /me3gpp:ManagedElement {
    if-feature me3gpp:CESManagementFunction;
    uses CESManagementFunctionSubtree;
  }
  augment /subnet3gpp:SubNetwork {
    if-feature subnet3gpp:CESManagementFunction;
    uses CESManagementFunctionSubtree;
  }
}
<CODE ENDS>
```

E.5.35 module _3gpp-nr-nrm-operatordu.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-operatordu {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-operatordu";
  prefix "operdu3gpp";

  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-nr-nrm-gnbdufunction {prefix gnbdu3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the OperatorDU Information Object
    Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2021-10-01 { reference "Initial revision"; }

  grouping OperatorDUGrp {
    description "Represents the OperatorDU IOC.";
    reference "3GPP TS 28.541";
    uses gnbdu3gpp:GNBDUFunctionGrp {
      refine gNBId {
        mandatory true;
      }
      refine gNBIdLength {
        mandatory true;
      }
    }
  }

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

    list OperatorDU {
      description "Contains attributes to support the 5G MOCN network sharing.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses OperatorDUGrp;
      }
      uses gnbdu3gpp:GNBDUFunctionGrp;
    }
  }
}
<CODE ENDS>
```

E.5.36 module _3gpp-nr-nrm-nroperatorcelldu.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-nroperatorcelldu {
  yang-version 1.1;
```

```
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-nroperatorcelldu";
  prefix "nropcelld3gpp";

  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-nr-nrm-operatordu { prefix operdu3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-nr-nrm-gnbdufunction { prefix gnbdu3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the OperatorDU Information Object
    Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2021-10-01 { reference "Initial revision"; }

  grouping NROperatorCellDUGrp {
    description "Represents the NROperatorCellDU IOC.";
    reference "3GPP TS 28.541";
    uses operdu3gpp:OperatorDUGrp;

    leaf cellLocalId {
      description "Identifies an NR cell of a gNB. Together with the
        corresponding gNB identifier in forms the NR Cell Identity (NCI).";
      reference "NCI in 3GPP TS 38.300";
      type int32 { range "0..16383"; }
    }

    leaf administrativeState  {
      description "Administrative state of the NROperatorCellDU. Indicates the
        permission to use or prohibition against using the cell, imposed
        through the OAM services.";
      type types3gpp:AdministrativeState;
      default LOCKED;
    }

    list pLMNInfoList {
      description "The PLMNInfoList is a list of PLMNInfo data type. It
        defines which PLMNs that can be served by the NR cell, and which
        S-NSSAIs that can be supported by the NR cell for corresponding PLMN
        in case of network slicing feature is supported. The plMNId of the
        first entry of the list is the PLMNId used to construct the nCGI for
        the NR cell.";
      key "mcc mnc sd sst";
      min-elements 1;
      ordered-by user;
      uses types5g3gpp:PLMNInfo;
    }

    leaf nRTAC {
      description "The common 5GS Tracking Area Code for the PLMNs.";
      reference "3GPP TS 23.003, 3GPP TS 38.473";
      type types3gpp:Tac;
    }

    leaf-list nRCellDURef {
      description "Reference to corresponding NRCellDU instance.";
      type types3gpp:DistinguishedName;
    }

  }

  augment "/me3gpp:ManagedElement/gnbdu3gpp:GNBDUFunction/operdu3gpp:OperatorDU"
  {

    list NROperatorCellDU {
      description "Contains attributes to support 5G MOCN network sharing.";
      reference "3GPP TS 28.541";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses NROperatorCellDUGrp;
      }
    uses gnbdu3gpp:GNBDUFunctionGrp;
    }
  }
```

```
}
<CODE ENDS>
```

E.5.37 module _3gpp-nr-nrm-dlbofunction.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-dlbofunction {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-dlbofunction";
  prefix "dlbof3gpp";

  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-nr-nrm-gnbcucpfunction { prefix gnbcucp3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-nr-nrm-nrcellcu { prefix nrcellcu3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the DLBOFunction
    Information Object Class (IOC) that is part of the NR Network Resource
    Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2022-03-25 { reference "CR-0683"; }
  revision 2021-10-22 { reference "CR-0577"; }

  feature DLBOUnderGNBCUCPFunction {
    description "The DLBOFunction shall be available under
      GNBCUCPFunction";
  }

  feature DLBOUnderManagedElement {
    description "The DLBOFunction shall be available under
      ManagedElement";
  }

  feature DLBOUnderSubNetwork {
    description "The DLBOFunction shall be available under
      SubNetwork";
  }
  grouping DLBOFunctionGrp {
    description "Represents the DLBOFunction IOC.";

    leaf dlboControl {
      description "This attribute determines whether the LBO function is
        enabled or disabled.";
      type boolean;
    }

    leaf maximumDeviationHoTriggerLow {
      description "This parameter defines the maximum allowed lower
        deviation of the Handover Trigger, from the default point of
        operation.";
        type int32 { range "-20..20"; }
        units "0.5 dB";
    }

    leaf maximumDeviationHoTriggerHigh {
      description "This parameter defines the maximum allowed upper
        deviation of the Handover Trigger, from the default point of
        operation.";
        type int32 { range "-20..20"; }
        units "0.5 dB";
    }

    leaf minimumTimeBetweenHoTriggerChange {
      description "This parameter defines the minimum allowed time interval
        between two Handover Trigger change performed by MRO. This is used
        to control the stability and convergence of the algorithm.";
        type int32 { range "0..604800"; }
        units "1";
    }

  }
```

```
  grouping DLBOFunctionSubtree {
    list DLBOFunction {
      description "This IOC contains attributes to support the D-SON function
        of LBO.

        In the case where multiple DLBO MOIs exist at different levels of the
        containment tree, the DLBO MOI at the lower level overrides the DLBO
        MOIs at higher level(s) of the same containment tree.";
      reference "clause 7.1.2 in TS 28.313";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses DLBOFunctionGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/gnbcucp3gpp:GNBCUCPFunction/"+
      "nrcellcu3gpp:NRCellCU" {
    if-feature DLBOUnderGNBCUCPFunction;
    uses DLBOFunctionSubtree;
  }
  augment /me3gpp:ManagedElement {
    if-feature DLBOUnderManagedElement;
    uses DLBOFunctionSubtree;
  }
  augment /subnet3gpp:SubNetwork {
    if-feature DLBOUnderSubNetwork;
    uses DLBOFunctionSubtree;
  }
}
<CODE ENDS>
```

E.5.38 module _3gpp-nr-nrm-rimrsset.yang

```
<CODE BEGINS>
module _3gpp-nr-nrm-rimrsset {
  yang-version 1.1;
  namespace "urn:3gpp:sa5:_3gpp-nr-nrm-rimrsset";
  prefix "rrsset3gpp";

  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Defines the YANG mapping of the RimRSSet Information Object
    Class (IOC) that is part of the NR Network Resource Model (NRM).";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2021-10-28 { reference CR-0607 ; }

  grouping FrequencyDomainParaGrp {
    description "Configuration parameters of frequency domain resource to
      support RIM RS. ";

    leaf rimRSSubcarrierSpacing {
      type  uint8 {
        range 0|1 ;
      }
      mandatory true;
      description
        "It is the subcarrier spacing configuration (u) for the RIM-RS.
        Subcarrier spacing delta-f=2^u*15 kHz. (see 38.211 subclause 5.3.3).";
    }

    leaf rIMRSBandwidth {
      type  uint8 {
        range 1..96 ;
      }
      mandatory true;
      description "It is the bandwidth of the RIM-RS in resource blocks
        (see 38.211 subclause 5.3.3).
        For carrier bandwidth larger than 20MHz, this attribute 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 attribute
        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";
    }

    leaf nrofGlobalRIMRSFrequencyCandidates {
      type  uint8 {
        range 1|2|4 ;
      }
      mandatory true;
      description "The number of candidate frequency resources in the whole
        network (N_f^RIM ) (see 38.211 subclause 7.4.1.6).";
    }

    leaf-list rimRSCommonCarrierReferencePoint {
      type  int32 ;
    }

    leaf rimRSStartingFrequencyOffsetIdList {
      type  uint32 {
        range 0..550;
      }
      must 'count(.) = ../nrofGlobalRIMRSFrequencyCandidates' {
        error-message
          "The multiplicity must be equal to nrofGlobalRIMRSFrequencyCandidates";
      }
      description "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 subclause 7.4.1.6).

        allowedValues: 0..maxNrofPhysicalResourceBlocks-1 where
        maxNrofPhysicalResourceBlocks = 550";
    }
  }

  grouping SequenceDomainParaGrp {
    description "Configuration parameters of sequence domain resource to
      support RIM RS. ";

    leaf nrofRIMRSSequenceCandidatesofRS1 {
      type  uint8 {
        range 1..8 ;
      }
      mandatory true;
      description "The number of candidate sequences assigned for RIM RS-1
      (N_s^RIM,1) (see 38.211 [subclause 7.4.1.6). It should be even when
      enableEnoughNotEnoughIndication for RS-1 is ON";
    }

    leaf-list rimRSScrambleIdListofRS1 {
      type uint32 {
        range 0..1023 ;
      }
      must 'count(.) = ../nrofRIMRSSequenceCandidatesofRS1' {
        error-message
          "The multiplicity must be equal to nrofRIMRSSequenceCandidatesofRS1";
      }
      description "List of configured scrambling identities for RIM RS-1 (
        see 38.211 [subclause 7.4.1.6). The size of the list is
        nrofRIMRSSequenceCandidatesofRS1.";
    }

    leaf nrofRIMRSSequenceCandidatesofRS2 {
      type  uint8 {
        range 1..8 ;
      }
      mandatory true;
      description "The number of candidate sequences assigned for RIM RS-2
        (N_s^RIM,2) (see 38.211 subclause 7.4.1.6).";
    }
```

```
    leaf rimRSScrambleIdListofRS2 {
      type uint32 {
        range 0..1023 ;
      }
      must 'count(.) = ../nrofRIMRSSequenceCandidatesofRS2' {
        error-message
          "The multiplicity must be equal to nrofRIMRSSequenceCandidatesofRS2";
      }
      description "List of configured scrambling identities for RIM RS-2 (
        see 38.211 subclause 7.4.1.6).
        The size of the list is nrofRIMRSSequenceCandidatesofRS2.";
    }

    leaf enableEnoughNotEnoughIndication {
      type types3gpp:EnabledDisabled;
      default DISABLED;
      description "It is indication of whether 'Enough'/'Not enough' indication
        functionality is enabled for RIM RS-1 (see 38.211 subclause 7.4.1.6).

        If the indication is 'ENABLED', 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

        enableEnoughNotEnoughIndication is equivalent to EnoughIndication
        (see 38.211 subclause 7.4.1.6)";
    }

    leaf RIMRSScrambleTimerMultiplier {
      type uint32  {
        range 0..2147483647;
      }
      mandatory true;
      description "It is parameter multiplier factor gamma for initialization
        seed of the pseudo-random sequence c~(i)
        (see 38.211 subclause 7.4.1.6.2).
        allowedValues:  0,1...2^31-1";
    }

    leaf RIMRSScrambleTimerOffset {
      type uint32  {
        range 0..2147483647;
      }
      mandatory true;
      description "It is parameter offset delta for initialization seed of
        the pseudo-random sequence c~(i) (see 38.211 subclause 7.4.1.6.2).
        allowedValues: 0,1...2^31-1";
    }
  }

  grouping TimeDomainParaGrp {
    description "Configuration parameters of time domain resource to
      support RIM RS. ";

    leaf dlULSwitchingPeriod1 {
      type enumeration {
        enum  MS0P5;
        enum  MS0P625;
        enum  MS1;
        enum  MS1P25;
        enum  MS2;
        enum  MS2P5;
        enum  MS3;
        enum  MS4;
        enum  MS5;
        enum  MS10;
        enum  MS20;
      }
      mandatory true;
      description "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 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.

      P1 is equivalent to T_(per,1)^RIM  (see 38.211, subclause 7.4.1.6).

      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.";
  }

  leaf symbolOffsetOfReferencePoint1 {
    type uint32  {
      range 2..327679 ;
    }
    mandatory true;
    description "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 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";
  }

  leaf dlULSwitchingPeriod2 {
    type enumeration {
      enum  MS0P5;
      enum  MS0P625;
      enum  MS1;
      enum  MS1P25;
      enum  MS2;
      enum  MS2P5;
      enum  MS3;
      enum  MS4;
      enum  MS5;
      enum  MS10;
    }
    mandatory true;
    description "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 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
```

```
        P2 is equivalent to T_(per,2)^RIM  (see 38.211 subclause 7.4.1.6)";
    }

    leaf symbolOffsetOfReferencePoint2 {
      type uint32  {
        range 2..327679 ;
      }
      mandatory true;
      description "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 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";
    }

    leaf totalnrofSetIdofRS1 {
      type uint32  {
        range 0..4194303 ;
      }
      mandatory true;
      description "It is the total number of set IDs for RIM RS-1
        (N_setID ^RIM,1) (see 38.211 subclause 7.4.1.6).

        allowedValues: 0,1...2^22-1";
    }

    leaf totalnrofSetIdofRS2 {
      type uint32  {
        range 0..4194304 ;
      }
      mandatory true;
      description "It is the total number of set IDs for RIM RS-2
        (N_setID^RIM,2) (see 38.211 subclause 7.4.1.6).

        allowedValues: 0,1...2^22";
    }

    leaf nrofConsecutiveRIMRS1 {
      type uint8 {
        range 1|2|4|8 ;
      }
      mandatory true;
      description "It is the number of consecutive uplink-downlink switching
        periods for RS-1 (R1) for repetition/near-far indication:.
        (see 38.211 subclause 7.4.1.6).

        allowedValues: 1,2,4,8";
    }

    leaf nrofConsecutiveRIMRS2 {
      type uint8 {
        range 1|2|4|8 ;
      }
      mandatory true;
      description "It is the number of consecutive uplink-downlink switching
        periods for RS-2 (R2) for repetition/near-far indication.
        (see 38.211 subclause 7.4.1.6).

        allowedValues: 1,2,4,8";
    }

    leaf-list consecutiveRIMRS1List {
      type  uint32 {
        range 2..327679 ;
      }
      description "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 (N_symb,ref^(RIM,1)) before the reference point.
        The size of the list is nrofConsecutiveRIMRS1
        (see 38.211 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";
    }

    leaf-list consecutiveRIMRS2List {
      type  uint32 {
        range 2..327679 ;
      }
      description "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 (N_symb,ref^(RIM,2)) before the reference
        point. The size of the list is nrofConsecutiveRIMRS2
        (see 38.211 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";
    }

    leaf enablenearfarIndicationRS1 {
      type types3gpp:EnabledDisabled;
      default DISABLED;
      description "It is indication of whether near-far functionality is enabled
        for RIM RS1.

        If the indication is 'ENABLED',
        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.";
    }

    leaf enablenearfarIndicationRS2 {
      type types3gpp:EnabledDisabled;
      default DISABLED;
      description "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.";
    }
  }

  grouping RimRSGlobalGrp {
    description "Represents the RimRSGlobal IOC.";

    list frequencyDomainPara {
      key  rimRSSubcarrierSpacing;
      min-elements 1;
      max-elements 1;
      description "Configuration parameters of frequency domain resource to
        support RIM RS. ";
        uses FrequencyDomainParaGrp;
    }

    list sequenceDomainPara {
      key  nrofRIMRSSequenceCandidatesofRS1;
      min-elements 1;
      max-elements 1;
      description "Configuration parameters of sequence domain resource to
        support RIM RS. ";
        uses SequenceDomainParaGrp;
    }

    list timeDomainPara {
      key  dlULSwitchingPeriod1;
      min-elements 1;
      max-elements 1;
      description "Configuration parameters of time domain resource to
        support RIM RS. ";
        uses TimeDomainParaGrp;
    }
  }
```

```
  grouping RimRSSetGrp {
    description "Represents the RimRSSet IOC.";

    leaf setId {
      type uint32 {
        range 0..4194303 ;
      }
      mandatory true;
      description "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).

        allowedValues: The bit length of the set ID is maximum 22bit.";
    }

    leaf setType {
      type enumeration {
        enum RS1;
        enum RS2;
      }
      mandatory true;
      description "The attribute specifies type of a RIM-RS Set .
        RIM RS1 is generated and transmitted by victim to indicate its suffering
        remote interference, and RIM RS2 is generated and transmitted by
        aggressor to measure if Remote Interference still exist

        If the attribute value is 'RS1', the RIM-RS Set is victim set.
        If the attribute value is 'RS2', the RIM-RS Set is aggressor set.";
    }

    leaf-list nRCellDURef {
      type types3gpp:DistinguishedName;
      config false;
      description "This attribute contains the DN of a NR Cell (NRCellDU)";
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    list RimRSGlobal {
      description "Represents 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.";
      key id;
      max-elements 1;
      uses top3gpp:Top_Grp;
      container attributes {
        uses RimRSGlobalGrp;
      }

      list RimRSSet {
        description "Represents 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 ).";
        key id;
        uses top3gpp:Top_Grp;
        container attributes {
          uses RimRSSetGrp;
        }
      }
    }
  }
}
<CODE ENDS>
```

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): Void

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 TS 32.160 [47].

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 "TS28541_5GcNrm.yaml"

```
openapi: 3.0.1
info:
  title: 3GPP 5GC NRM
  version: 17.7.0
  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; 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: 'TS28623_ComDefs.yaml#/components/schemas/Ipv4Addr'
        ipv6Address:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Ipv6Addr'
        ipv6Prefix:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Ipv6Prefix'
        transport:
          $ref: 'TS28623_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: 'TS28623_GenericNrm.yaml#/components/schemas/NFType'
        nFStatus:
          $ref: '#/components/schemas/NFStatus'
        plmn:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnId'
        sNssais:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/Snssai'
        fqdn:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Fqdn'
        interPlmnFqdn:
          $ref: 'TS28623_ComDefs.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: 'TS28623_ComDefs.yaml#/components/schemas/Fqdn'
        interPlmnFqdn:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Fqdn'
        ipEndPoints:
          type: array
          items:
            $ref: '#/components/schemas/IpEndPoint'
        apiPrfix:
          type: string
```

```yaml
        allowedPlmns:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnId'
        allowedNfTypes:
          type: array
          items:
            $ref: 'TS28623_GenericNrm.yaml#/components/schemas/NFType'
        allowedNssais:
          type: array
          items:
            $ref: 'TS28541_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: 'TS28541_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
    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/Udrinfo'
    NotificationType:
      type: string
      enum:
        -  N1_MESSAGES
        -  N2_INFORMATION
        -  LOCATION_NOTIFICATION
        -  DATA_REMOVAL_NOTIFICATION
        -  DATA_CHANGE_NOTIFICATION
        -  LOCATION_UPDATE_NOTIFICATION
        -  NSSAA_REAUTH_NOTIFICATION
        -  NSSAA_REVOC_NOTIFICATION
```

```
    DefaultNotificationSubscription:
      type: object
      properties:
        notificationType:
          $ref: '#/components/schemas/NotificationType'
        callbackURI:
          type: string
        n1MessageClass:
          type: boolean
        n2InfroamtionClass:
          type: boolean
        versions:
          type: string
        binding:
          type: string
    ManagedNFProfile:
      type: object
      properties:
        nfInstanceID:
          type: string
        nfType:
          $ref: 'TS28623_GenericNrm.yaml#/components/schemas/NFType'
        heartbeatTimer:
          type: integer
        authzInfo:
          type: string
        hostAddr:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/HostAddr'
        allowedPLMNs:
          type: array
          items:
            $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnId'
        allowedSNPNs:
          type: array
          items:
            $ref: '#/components/schemas/SnpnInfo'
        allowedNfTypes:
          type: array
          items:
            $ref: 'TS28623_GenericNrm.yaml#/components/schemas/NFType'
        allowedNfDomains:
          type: array
          items:
            type: string
        allowedNSSAIs:
          type: array
          items:
            $ref: 'TS28541_NrNrm.yaml#/components/schemas/Snssai'
        locality:
          type: string
        nFInfo:
          $ref: '#/components/schemas/NFInfo'
        capacity:
          type: integer
        nfSetIdList:
          type: array
          items:
            type: string
        servingScope:
          type: array
          items:
            type: string
        nfSetRecoveryTimeList:
          type: array
          items:
            $ref: 'TS28623_ComDefs.yaml#/components/schemas/DateTime'
        scpDomains:
          type: array
          items:
            type: string
        vendorId:
          type: string
    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: 'TS28623_ComDefs.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
    NetworkSliceInfo:
      type: object
      properties:
        sNSSAI:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/Snssai'
        cNSIId:
          $ref: '#/components/schemas/CNSIId'
        networkSliceRef:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/DnList'
    NetworkSliceInfoList:
      type: array
      items:
        $ref: '#/components/schemas/NetworkSliceInfo'

    PacketErrorRate:
      type: object
      properties:
        scalar:
          type: integer
        exponent:
          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

    QosData:
      type: object
      properties:
        qosId:
          type: string
        fiveQIValue:
          type: integer
        maxbrUl:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
        maxbrDl:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
        gbrUl:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
        gbrDl:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRateRm'
        arp:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Arp'
        qosNotificationControl:
          type: boolean
        reflectiveQos:
          type: boolean
        sharingKeyDl:
          type: string
        sharingKeyUl:
          type: string
        maxPacketLossRateDl:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketLossRateRm'
        maxPacketLossRateUl:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketLossRateRm'
        extMaxDataBurstVol:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ExtMaxDataBurstVolRm'

    QosDataList:
      type: array
      items:
        $ref: '#/components/schemas/QosData'

    SteeringMode:
      type: object
      properties:
        steerModeValue:
          $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/SteerModeValue'
        active:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
        standby:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessTypeRm'
        threeGLoad:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        prioAcc:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'

    TrafficControlData:
      type: object
      properties:
        tcId:
          type: string
        flowStatus:
          $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/FlowStatus'
        redirectInfo:
          $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/RedirectInformation'
        addRedirectInfo:
          type: array
```

```
          items:
            $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/RedirectInformation'
          minItems: 1
        muteNotif:
          type: boolean
        trafficSteeringPolIdDl:
          type: string
          nullable: true
        trafficSteeringPolIdUl:
          type: string
          nullable: true
        routeToLocs:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
        traffCorreInd:
          type: boolean
        upPathChgEvent:
          $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/UpPathChgEvent'
        steerFun:
          $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/SteeringFunctionality'
        steerModeDl:
          $ref: '#/components/schemas/SteeringMode'
        steerModeUl:
          $ref: '#/components/schemas/SteeringMode'
        mulAccCtrl:
          $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/MulticastAccessControl'
        snssaiList:
          $ref: '#/components/schemas/SnssaiList'

    TrafficControlDataList:
      type: array
      items:
        $ref: '#/components/schemas/TrafficControlData'

    PccRule:
      type: object
      properties:
        pccRuleId:
          type: string
          description: Univocally identifies the PCC rule within a PDU session.
        flowInfoList:
          type: array
          items:
            $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/FlowInformation'
        applicationId:
          type: string
        appDescriptor:
          $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/ApplicationDescriptor'
        contentVersion:
          $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/ContentVersion'
        precedence:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        afSigProtocol:
          $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/AfSigProtocol'
        isAppRelocatable:
          type: boolean
        isUeAddrPreserved:
          type: boolean
        qosData:
          type: array
          items:
            $ref: '#/components/schemas/QosDataList'
        altQosParams:
          type: array
          items:
            $ref: '#/components/schemas/QosDataList'
        trafficControlData:
          type: array
          items:
            $ref: '#/components/schemas/TrafficControlDataList'
        conditionData:
            $ref: 'TS29512_Npcf_SMPolicyControl.yaml#/components/schemas/ConditionData'
        tscaiInputDl:
          $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/TscaiInputContainer'
        tscaiInputUl:
          $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/TscaiInputContainer'
```

```
    SnssaiInfo:
      type: object
      properties:
        plmnInfo:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnInfo'
        administrativeState:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/AdministrativeState'

    NsacfInfoSnssai:
      type: object
      properties:
        SnssaiInfo:
          $ref: '#/components/schemas/SnssaiInfo'
        isSubjectToNsac:
          type: boolean
        maxNumberofUEs:
          type: integer
        eACMode:
          type: string
          enum:
            - INACTIVE
            - ACTIVE
        activeEacThreshhold:
          type: integer
        deactiveEacThreshhold:
          type: integer
        numberofUEs:
          type: integer
        uEIdList:
          type: array
          items:
            type: string
        maxNumberofPDUSessions:
          type: integer

    NRTACRange:
      type: object
      properties:
        nRTACstart:
          type: string
        nRTACend:
          type: string
        nRTACpattern:
          type: string

    TaiRange:
      type: object
      properties:
        plmnId:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnId'
        nRTACRangelist:
          type: array
          items:
            $ref: '#/components/schemas/NRTACRange'

    GUAMInfo:
      type: object
      properties:
          pLMNId:
            $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnId'
          aMFIdentifier:
            type: integer

    SupportedBMOList:
      type: array
      items:
        type: string

    ECSAddrConfigInfo:
      type: array
      items:
        type: string

    DnnSmfInfoItem:
      type: object
      properties:
        dnn:
          type: string
```

```
        dnaiList:
          type: array
          items:
            type: string

    SNssaiSmfInfoItem:
      type: object
      properties:
        sNSSAI:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/Snssai'
        dnnSmfInfoList:
          type: array
          items:
            $ref: '#/components/schemas/DnnSmfInfoItem'

    IpAddr:
      type: object
      properties:
        ipv4Addr:
          type: string
        ipv6Addr:
          type: string
        ipv6Prefix:
          type: string

    5GCNfConnEcmInfoList:
      type: array
      items:
        $ref: '#/components/schemas/5GCNfConnEcmInfo'
    5GCNfConnEcmInfo:
      type: object
      description: 'Store the 5GC NF connection information'
      properties:
        5GCNFType:
          type: string
          enum:
            - PCF
            - NEF
            - SCEF
        5GCNFIpAddress:
          type: string
        5GCNFRef:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'

    UPFConnectionInfo:
      type: object
      properties:
        uPFIpAddress:
          type: string
        uPFRef:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
    SnssaiList:
      type: array
      items:
        $ref: 'TS28541_NrNrm.yaml#/components/schemas/Snssai'
    SnpnId:
      type: object
      properties:
        mcc:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Mcc'
        mnc:
          $ref: 'TS28623_ComDefs.yaml#/components/schemas/Mnc'
        nid:
          type: string
    SnpnInfo:
      type: object
      properties:
        snpnId:
          $ref: '#/components/schemas/SnpnId'
        snssai:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/Snssai'
    TaiList:
      type: array
      items:
        $ref: 'TS28541_NrNrm.yaml#/components/schemas/Tai'

#-------- Definition of concrete IOCs --------------------------------------------
    ProvMnS:
```

```
      oneOf:
        - type: object
          properties:
            SubNetwork:
              $ref: '#/components/schemas/SubNetwork-Multiple'
        - type: object
          properties:
            ManagedElement:
              $ref: '#/components/schemas/ManagedElement-Multiple'

    SubNetwork-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/SubNetwork-Attr'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/SubNetwork-ncO'
        - type: object
          properties:
            SubNetwork:
              $ref: '#/components/schemas/SubNetwork-Multiple'
            ManagedElement:
              $ref: '#/components/schemas/ManagedElement-Multiple'
            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'
            Dynamic5QISet:
              $ref: '#/components/schemas/Dynamic5QISet-Multiple'
            EcmConnectionInfo:
              $ref: '#/components/schemas/EcmConnectionInfo-Multiple'

    ManagedElement-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedElement-Attr'
        - $ref: 'TS28623_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'
        Dynamic5QISet:
          $ref: '#/components/schemas/Dynamic5QISet-Multiple'
        EcmConnectionInfo:
          $ref: '#/components/schemas/EcmConnectionInfo-Multiple'
        EASDFFunction:
          $ref: '#/components/schemas/EASDFFunction-Multiple'

AmfFunction-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                pLMNInfoList:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnInfoList'
                amfIdentifier:
                  $ref: '#/components/schemas/AmfIdentifier'
                sBIFqdn:
                  type: string
                interPlmnFQDN:
                  type: string
                taiList:
                  $ref: '#/components/schemas/TaiList'
                taiRangeList:
                  type: array
                  items:
                    $ref: '#/components/schemas/TaiRange'
                weightFactor:
                  $ref: '#/components/schemas/WeightFactor'
                cNSIIdList:
                  $ref: '#/components/schemas/CNSIIdList'
                gUAMIdList:
                  type: array
                  items:
                    $ref: '#/components/schemas/GUAMInfo'
                backupInfoAmfFailure:
                  type: array
                  items:
                    $ref: '#/components/schemas/GUAMInfo'
                backupInfoAmfRemoval:
                  type: array
                  items:
                    $ref: '#/components/schemas/GUAMInfo'
                amfSetRef:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
                commModelList:
                  $ref: '#/components/schemas/CommModelList'
    - $ref: 'TS28623_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: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                nRTACList:
                  $ref: '#/components/schemas/TACList'
                amfSetId:
                  $ref: '#/components/schemas/AmfSetId'
                snssaiList:
                  $ref: '#/components/schemas/SnssaiList'
                aMFRegionRef:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
                aMFSetMemberList:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/DnList'
AmfRegion-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                nRTACList:
                  $ref: '#/components/schemas/TACList'
                amfRegionId:
                  $ref: '#/components/schemas/AmfRegionId'
                snssaiList:
                  $ref: '#/components/schemas/SnssaiList'
                aMFSetListRef:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/DnList'
SmfFunction-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                pLMNInfoList:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnInfoList'
                nRTACList:
                  $ref: '#/components/schemas/TACList'
                sBIFqdn:
                  type: string
                sNssaiSmfInfoList:
                  type: array
                  items:
                    $ref: '#/components/schemas/SNssaiSmfInfoItem'
                taiList:
```

```
                $ref: '#/components/schemas/TaiList'
              taiRangeList:
                type: array
                items:
                  $ref: '#/components/schemas/TaiRange'
              pwgFqdn:
                type: string
              pgwAddrList:
                type: array
                items:
                  $ref: '#/components/schemas/IpAddr'
              accessType:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
              priority:
                type: integer
              cNSIIdList:
                $ref: '#/components/schemas/CNSIIdList'
              vsmfSupportInd:
                type: boolean
              pwgFqdnList:
                type: array
                items:
                  type: string
              managedNFProfile:
                $ref: '#/components/schemas/ManagedNFProfile'
              commModelList:
                $ref: '#/components/schemas/CommModelList'
              configurable5QISetRef:
                $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
              dynamic5QISetRef:
                $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'

    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        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'
        PredefinedPccRuleSet:
          $ref: '#/components/schemas/PredefinedPccRuleSet-Single'

UpfFunction-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                nRTACList:
                  $ref: '#/components/schemas/TACList'
                snssaiList:
                  $ref: '#/components/schemas/SnssaiList'
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
                supportedBMOList:
                  $ref: '#/components/schemas/SupportedBMOList'
    - $ref: 'TS28623_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: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                commModelList:
                  $ref: '#/components/schemas/CommModelList'
    - $ref: 'TS28623_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: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                sBIFqdn:
                  type: string
                snssaiList:
                  $ref: '#/components/schemas/SnssaiList'
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
                commModelList:
                  $ref: '#/components/schemas/CommModelList'
                configurable5QISetRef:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
                dynamic5QISetRef:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
                supportedBMOList:
                  $ref: '#/components/schemas/SupportedBMOList'

    - $ref: 'TS28623_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'
        PredefinedPccRuleSet:
          $ref: '#/components/schemas/PredefinedPccRuleSet-Single'

AusfFunction-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
```

```
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                    sBIFqdn:
                      type: string
                    snssaiList:
                      $ref: '#/components/schemas/SnssaiList'
                    managedNFProfile:
                      $ref: '#/components/schemas/ManagedNFProfile'
                    commModelList:
                      $ref: '#/components/schemas/CommModelList'
        - $ref: 'TS28623_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: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                    sBIFqdn:
                      type: string
                    snssaiList:
                      $ref: '#/components/schemas/SnssaiList'
                    managedNFProfile:
                      $ref: '#/components/schemas/ManagedNFProfile'
                    commModelList:
                      $ref: '#/components/schemas/CommModelList'
                    eCSAddrConfigInfo:
                      $ref: '#/components/schemas/ECSAddrConfigInfo'
        - $ref: 'TS28623_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: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                    sBIFqdn:
                      type: string
                    snssaiList:
                      $ref: '#/components/schemas/SnssaiList'
                    managedNFProfile:
                      $ref: '#/components/schemas/ManagedNFProfile'
    UdsfFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
```

```
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                sBIFqdn:
                  type: string
                snssaiList:
                  $ref: '#/components/schemas/SnssaiList'
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
    NrfFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                    sBIFqdn:
                      type: string
                    cNSIIdList:
                      $ref: '#/components/schemas/CNSIIdList'
                    nFProfileList:
                      $ref: '#/components/schemas/NFProfileList'
                    snssaiList:
                      $ref: '#/components/schemas/SnssaiList'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            EP_N27:
              $ref: '#/components/schemas/EP_N27-Multiple'
    NssfFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                    sBIFqdn:
                      type: string
                    cNSIIdList:
                      $ref: '#/components/schemas/CNSIIdList'
                    nFProfileList:
                      $ref: '#/components/schemas/NFProfileList'
                    snssaiList:
                      $ref: '#/components/schemas/SnssaiList'
                    commModelList:
                      $ref: '#/components/schemas/CommModelList'
        - $ref: 'TS28623_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: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
```

```
                $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
              sBIFqdn:
                type: string
              managedNFProfile:
                $ref: '#/components/schemas/ManagedNFProfile'
              commModelList:
                $ref: '#/components/schemas/CommModelList'
    - $ref: 'TS28623_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: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
                commModelList:
                  $ref: '#/components/schemas/CommModelList'
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        EP_NLS:
          $ref: '#/components/schemas/EP_NLS-Multiple'
NgeirFunction-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnIdList:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                sBIFqdn:
                  type: string
                snssaiList:
                  $ref: '#/components/schemas/SnssaiList'
                managedNFProfile:
                  $ref: '#/components/schemas/ManagedNFProfile'
                commModelList:
                  $ref: '#/components/schemas/CommModelList'
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    - type: object
      properties:
        EP_N17:
          $ref: '#/components/schemas/EP_N17-Multiple'
SeppFunction-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
            - type: object
              properties:
                plmnId:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnId'
                sEPPType:
                  $ref: '#/components/schemas/SEPPType'
                sEPPId:
                  type: integer
```

```
                fqdn:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/Fqdn'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            EP_N32:
              $ref: '#/components/schemas/EP_N32-Multiple'
    NwdafFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                    sBIFqdn:
                      type: string
                    snssaiList:
                      $ref: '#/components/schemas/SnssaiList'
                    managedNFProfile:
                      $ref: '#/components/schemas/ManagedNFProfile'
                    commModelList:
                      $ref: '#/components/schemas/CommModelList'
                    networkSliceInfoList:
                      $ref: '#/components/schemas/NetworkSliceInfoList'

    ScpFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    supportedFuncList:
                      $ref: '#/components/schemas/SupportedFuncList'
                    address:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/HostAddr'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
    NefFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    sBIFqdn:
                      type: string
                    snssaiList:
                      $ref: '#/components/schemas/SnssaiList'
                    managedNFProfile:
                      $ref: '#/components/schemas/ManagedNFProfile'
                    capabilityList:
                      $ref: '#/components/schemas/CapabilityList'
                    isCAPIFSup:
                      type: boolean
                    taiList:
                      $ref: '#/components/schemas/TaiList'
                    taiRangeList:
                      type: array
                      items:
                        $ref: '#/components/schemas/TaiRange'
                    dnai:
                      type: string

        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            EP_N33:
```

```yaml
            $ref: '#/components/schemas/EP_N33-Multiple'
    NsacfFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    managedNFProfile:
                      $ref: '#/components/schemas/ManagedNFProfile'
                    nsacfInfoSnssai:
                      type: array
                      items:
                        $ref: '#/components/schemas/NsacfInfoSnssai'
                    taiList:
                      $ref: '#/components/schemas/TaiList'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            EP_N60:
              $ref: '#/components/schemas/EP_N60-Multiple'

    DDNMFFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnId:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnId'
                    sBIFqdn:
                      type: string
                    managedNFProfile:
                      $ref: '#/components/schemas/ManagedNFProfile'
                    commModelList:
                      $ref: '#/components/schemas/CommModelList'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            EP_Npc4:
              $ref: '#/components/schemas/EP_Npc4-Multiple'
            EP_Npc6:
              $ref: '#/components/schemas/EP_Npc6-Multiple'
            EP_Npc7:
              $ref: '#/components/schemas/EP_Npc7-Multiple'
            EP_Npc8:
              $ref: '#/components/schemas/EP_Npc8-Multiple'

    EASDFFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnId:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnId'
                    sBIFqdn:
                      type: string
                    managedNFProfile:
                      $ref: '#/components/schemas/ManagedNFProfile'
                    serverAddr:
                      type: string
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'
        - type: object
          properties:
            EP_N88:
              $ref: '#/components/schemas/EP_N88-Multiple'
```

```
    EcmConnectionInfo-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    eASServiceArea:
                      $ref: 'TS28538_EdgeNrm.yaml#/components/schemas/ServingLocation'
                    eESServiceArea:
                      $ref: 'TS28538_EdgeNrm.yaml#/components/schemas/ServingLocation'
                    eDNServiceArea:
                      $ref: 'TS28538_EdgeNrm.yaml#/components/schemas/ServingLocation'
                    eASIpAddress:
                      type: string
                    eESIpAddress:
                      type: string
                    eCSIpAddress:
                      type: string
                    ednIdentifier:
                      type: string
                    ecmConnectionType:
                      type: string
                      enum:
                        - USERPLANE
                        - CONTROLPLANE
                        - BOTH
                    5GCNfConnEcmInfoList:
                      $ref: '#/components/schemas/5GCNfConnEcmInfoList'
                    uPFConnectionInfo:
                      $ref: '#/components/schemas/UPFConnectionInfo'


    ExternalAmfFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
                    amfIdentifier:
                      $ref: '#/components/schemas/AmfIdentifier'
    ExternalNrfFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
    ExternalNssfFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
                - type: object
                  properties:
                    plmnIdList:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnIdList'
    ExternalSeppFunction-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
```

```yaml
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'
              - type: object
                properties:
                  plmnId:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnId'
                  sEPPId:
                    type: integer
                  fqdn:
                    $ref: 'TS28623_ComDefs.yaml#/components/schemas/Fqdn'


  EP_N2-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
  EP_N3-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
                  epTransportRefs:
                    $ref: 'TS28623_ComDefs.yaml#/components/schemas/DnList'
  EP_N4-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
  EP_N5-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
  EP_N6-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
```

```
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
            - type: object
              properties:
                localAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                remoteAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
  EP_N7-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
  EP_N8-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
  EP_N9-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
  EP_N10-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
  EP_N11-Single:
    allOf:
      - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
      - type: object
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
```

```yaml
    EP_N12-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N13-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N14-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N15-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N16-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N17-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
```

```
            - type: object
              properties:
                localAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                remoteAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'

    EP_N20-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'

    EP_N21-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N22-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'

    EP_N26-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N27-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
```

```
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'


    EP_N31-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_N32-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    remotePlmnId:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnId'
                    remoteSeppAddress:
                      $ref: 'TS28623_ComDefs.yaml#/components/schemas/HostAddr'
                    remoteSeppId:
                      type: integer
                    n32cParas:
                      type: string
                    n32fPolicy:
                      type: string
                    withIPX:
                      type: boolean
    EP_N33-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_S5C-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_S5U-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
```

```
                $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
              remoteAddress:
                $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
EP_Rx-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
            - type: object
              properties:
                localAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                remoteAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
EP_MAP_SMSC-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
            - type: object
              properties:
                localAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                remoteAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
EP_NLS-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
            - type: object
              properties:
                localAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                remoteAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
EP_NLG-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
            - type: object
              properties:
                localAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                remoteAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'

EP_N60-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
            - type: object
              properties:
                localAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                remoteAddress:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
EP_Npc4-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
```

```
        properties:
          attributes:
            allOf:
              - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
              - type: object
                properties:
                  localAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                  remoteAddress:
                    $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_Npc6-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_Npc7-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'
    EP_Npc8-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'

    EP_N88-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/EP_RP-Attr'
                - type: object
                  properties:
                    localAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/LocalAddress'
                    remoteAddress:
                      $ref: 'TS28541_NrNrm.yaml#/components/schemas/RemoteAddress'

    FiveQiDscpMappingSet-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    FiveQiDscpMappingList:
```

```
                  type: array
                  items:
                    $ref: '#/components/schemas/FiveQiDscpMapping'

    FiveQICharacteristics-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - 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
    FiveQICharacteristics-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/FiveQICharacteristics-Single'
    Configurable5QISet-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    configurable5QIs:
                      $ref: '#/components/schemas/FiveQICharacteristics-Multiple'

    Dynamic5QISet-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    dynamic5QIs:
                      $ref: '#/components/schemas/FiveQICharacteristics-Multiple'

    GtpUPathQoSMonitoringControl-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    gtpUPathQoSMonitoringState:
                      type: string
                      enum:
                        - ENABLED
                        - DISABLED
                    gtpUPathMonitoredSNSSAIs:
                      type: array
                      items:
                        $ref: 'TS28541_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: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    qFQoSMonitoringState:
                      type: string
                      enum:
                        - ENABLED
                        - DISABLED
                    qFMonitoredSNSSAIs:
                      type: array
                      items:
                        $ref: 'TS28541_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

    PredefinedPccRuleSet-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - type: object
                  properties:
                    predefinedPccRules:
                      type: array
                      items:
                        $ref: '#/components/schemas/PccRule'

#-------- 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'
```

```yaml
    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'

    NsacfFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NsacfFunction-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'

    EASDFFunction-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EASDFFunction-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_N33-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_N33-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'
    EP_N60-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_N60-Single'
    EP_Npc4-Multiple:
      type: array
      items:
```

```
        $ref: '#/components/schemas/EP_Npc4-Single'
    EP_Npc6-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_Npc6-Single'
    EP_Npc7-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_Npc7-Single'
    EP_Npc8-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_Npc8-Single'
    EP_N88-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_N88-Single'
    Configurable5QISet-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/Configurable5QISet-Single'
    Dynamic5QISet-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/Dynamic5QISet-Single'
    EcmConnectionInfo-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EcmConnectionInfo-Single'



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

    resources-5gcNrm:
      oneOf:
       - $ref: '#/components/schemas/ProvMnS'
       - $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/NsacfFunction-Single'
       - $ref: '#/components/schemas/DDNMFFunction-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_N32-Single'
        - $ref: '#/components/schemas/EP_N33-Single'
        - $ref: '#/components/schemas/EP_N60-Single'
        - $ref: '#/components/schemas/EP_N88-Single'

        - $ref: '#/components/schemas/EP_Npc4-Single'
        - $ref: '#/components/schemas/EP_Npc6-Single'
        - $ref: '#/components/schemas/EP_Npc7-Single'
        - $ref: '#/components/schemas/EP_Npc8-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'
        - $ref: '#/components/schemas/PredefinedPccRuleSet-Single'
        - $ref: '#/components/schemas/Dynamic5QISet-Single'
        - $ref: '#/components/schemas/EASDFFunction-Single'
        - $ref: '#/components/schemas/EcmConnectionInfo-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.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";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "The model defines common types for 5G networks and
    network slicing.";
  reference "3GPP TS 28.541";

  revision 2021-08-05 { reference S5-214053/CR-0518; }
  revision 2020-11-05 { reference CR-0412 ; }
  revision 2019-10-20 { reference "Initial version."; }

  grouping SNssai {
    description
      "Single Network Slice Selection Assistance Information(S-NSSAI)";
    reference "3GPP TS 23.003";

    leaf sd {
      description "Slice Differentiator
        If not needed, the value can be set to FFFFFF.";
      type string{
        length 6;
        pattern '[a-fA-F0-9]*';
      }
      reference "3GPP TS 23.003";
    }
```

```
    leaf sst {
      type uint8;
      description "Slice/Service Type.
         Values 0 to 127 belong to standardized SST range and are defined in
         3GPP TS 23.501. Values 128 to 255 belong to operator-specific range.";
    }
  }

  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";
    uses types3gpp:PLMNId;
    uses SNssai;
  }

  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;
    }
  }

  typedef EnergySavingLoadThresholdT {
    type uint32 {
      range 0..10000;
    }
```

```
    units 1/10000;
  }

  typedef EnergySavingTimeDurationT {
    type uint32 {
      range 0..900;
    }
    units seconds;
  }

  typedef PhysCellID {
    type uint32 {
      range "0..1007";
    }
    reference "clause 7.4.2 of TS 38.211";
  }

  typedef UTC24TimeOfDayT {
    description "Time of day in HH:MM or H:MM 24-hour format per UTC
      time zone.";
    type string {
      pattern "(([01]?[0-9])|(2[0-3])):([0-5][0-9])";
    }
  }

  typedef DayOfWeekT {
    type enumeration {
      enum Monday;
      enum Tuesday;
      enum Wednesday;
      enum Thursday;
      enum Friday;
      enum Saturday;
      enum Sunday;
    }
  }

}
```

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.yang

```
<CODE BEGINS>
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; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "AMFFunction derived from basic ManagedFunction.";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2022-01-07 { reference CR-0643; }
  revision 2020-11-06 { reference CR-0412 ; }
  revision 2019-10-25 { reference "S5-194457 S5-193518"; }

  revision 2019-05-31 { reference "Ericsson refactoring."; }
  revision 2018-08-07 { reference "Initial revision"; }

  grouping AMFFunctionGrp {
    description "Represents the AMFFunction IOC";
    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;
    }

    list sNSSAIList {
      min-elements 1;
      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";
      key "sd sst";
      uses types5g3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      max-elements 1;
      uses types3gpp:ManagedNFProfile;
    }

    list commModelList {
      min-elements 1;
      key "groupId";
```

```
      description "Specifies a list of commModel. It can be used by NF and
        NF services to interact with each other in 5G Core network ";
      reference "3GPP TS 23.501";
      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;
    }
  }
}
<CODE ENDS>
```

H.5.3 module _3gpp-5gc-nrm-amfregion.yang

```
<CODE BEGINS>
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; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "This IOC represents the AMF Region which consists one or
    multiple AMF Sets.";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2022-01-07 { reference CR-0643; }
  revision 2020-11-06 { reference CR-0412 ; }
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-11 { reference ""; }

  grouping AMFRegionGrp {
    description "Represents the AMFRegion IOC";
    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;
    }

    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";
      key "sd sst";
      uses types5g3gpp: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;
    }
  }
}
<CODE ENDS>
```

H.5.4 module _3gpp-5gc-nrm-amfset.yang

```
<CODE BEGINS>
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; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "This IOC represents the AMF Set which consists of some AMFs
    that serve a given area and Network Slice.";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2022-01-07 { reference CR-0643; }
  revision 2020-11-06 { reference CR-0412 ; }
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-06-11 { reference "Ericsson refactoring."; }

  grouping AMFSetGrp {
    description "Represents the AMFSet IOC";
    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;
    }

    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";
      key "sd sst";
      uses types5g3gpp: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;
    }
  }
}
<CODE ENDS>
```

H.5.5 module _3gpp-5gc-nrm-ausffunction.yang

```
<CODE BEGINS>
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";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  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 2022-01-07 { reference CR-0643; }
  revision 2020-11-06 { reference CR-0412 ; }
  revision 2019-10-25 { reference "S5-194457 S5-193518"; }

  revision 2019-05-22 {reference "initial revision"; }

  grouping AUSFFuntionGrp {
```

```
    description "Represents the AUSFFuntion IOC";
    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;
    }

    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";
      key "sd sst";
      uses types5g3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      max-elements 1;
      uses types3gpp:ManagedNFProfile;
    }


    list commModelList {
      min-elements 1;
      key "groupId";
      description "Specifies a list of commModel. It can be used by NF and
        NF services to interact with each other in 5G Core network ";
      reference "3GPP TS 23.501";
      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;
    }
  }
}
<CODE ENDS>
```

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.yang

```
<CODE BEGINS>
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; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "NF service class.";
  reference "3GPP TS 29.510";

  revision 2021-01-25 { reference CR-0454 ; }
  revision 2020-11-05 { reference CR-0412 ; }
  revision 2019-06-17 { reference "initial revision"; }

  grouping NFServiceGrp {
```

```
    description "Represents the NFService IOC";
    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;
      }

      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
        key "sd sst";
        uses types5g3gpp: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;
    }
  }
}
<CODE ENDS>
```

H.5.14 module _3gpp-5gc-nrm-ngeirfunction.yang

```
<CODE BEGINS>
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";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  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 2022-01-07 { reference CR-0643; }
  revision 2020-11-06 { reference CR-0412 ; }
  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

  revision 2019-05-15 {reference "initial revision"; }
```

```
  grouping NGEIRFunctionGrp {
    description "Represents the NGEIRFunction IOC";
    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 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";
      key "sd sst";
      uses types5g3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      max-elements 1;
      uses types3gpp:ManagedNFProfile;
    }

    list commModelList {
      min-elements 1;
      key "groupId";
      description "Specifies a list of commModel. It can be used by NF and
        NF services to interact with each other in 5G Core network ";
      reference "3GPP TS 23.501";
      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;
    }
  }
}
<CODE ENDS>
```

H.5.15 module _3gpp-5gc-nrm-nrffunction.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; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }

  organization "3gpp SA5";
```

```
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "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 2020-11-05 { reference CR-0412 ; }
  revision 2020-08-03 { reference "CR-0321"; }
  revision 2019-10-28 { reference S5-193518 ; }
  revision 2019-05-15 { reference "initial revision"; }

  grouping NRFFunctionGrp {
    description "Represents the NRFFunction IOC";
    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 cNSIIdList {
      description "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
        and subclause 6.1.6.2.7 of 3GPP TS 29.531";
      type string;
    }

    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";
      key "sd sst";
      uses types5g3gpp: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.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; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "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 2020-11-05 { reference CR-0412 ; }
  revision 2020-08-03 { reference "CR-0321"; }
  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }
  revision 2019-05-15 { reference "initial revision"; }

  grouping NSSFFunctionGrp {
    description "Represents the NSSFFunction IOC";
    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;
    }

    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";
      key "sd sst";
      uses types5g3gpp:SNssai;
    }

    leaf-list cNSIIdList {
      description "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
        and subclause 6.1.6.2.7 of 3GPP TS 29.531";
      type string;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      max-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.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";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  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 2020-11-05 { reference CR-0412 ; }
  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

  revision 2019-05-15 {reference "initial revision"; }

  grouping NWDAFFunctionGrp {
    description "Represents the NWDAFFunction IOC";
    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;
    }

    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";
      key "sd sst";
      uses types5g3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      max-elements 1;
      uses types3gpp:ManagedNFProfile;
    }

    list commModelList {
```

```
      min-elements 1;
      key "groupId";
      description "Specifies a list of commModel. It can be used by NF and
        NF services to interact with each other in 5G Core network ";
      reference "3GPP TS 23.501";
      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.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";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  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 2020-11-05 { reference CR-0412 ; }
  revision 2020-08-06 { reference "CR-0333"; }
  revision 2020-08-06 { reference "CR-0331"; }
  revision 2019-10-25 { reference "S5-194457 S5-193518"; }
  revision 2019-05-22 { reference "initial revision"; }

  grouping PCFFuntionGrp {
    description "Represents the PCFFuntion IOC";
    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;
    }

    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";
      key "sd sst";
      uses types5g3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      max-elements 1;
      uses types3gpp:ManagedNFProfile;
    }
    list commModelList {
      min-elements 1;
      key "groupId";
      description "Specifies a list of commModel. It can be used by NF and
        NF services to interact with each other in 5G Core network ";
      reference "3GPP TS 23.501";
      uses types5g3gpp:CommModel;
    }
    leaf dynamic5QISetRef {
      type types3gpp:DistinguishedName;
      description "DN of the Dynamic5QISet that the PCFFunction supports
        (is associated to).";
    }
    leaf configurable5QISetRef {
      type types3gpp:DistinguishedName;
      description "DN of the Configurable5QISet that the PCFFunction supports
        (is associated to).";
    }
  }

  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.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 2020-08-03 { reference "CR-0321"; }
  revision 2019-10-28 { reference S5-193518 ; }

  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.5.19a module _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.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; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "SMFFunction derived from basic ManagedFunction.";

  revision 2020-11-05 { reference CR-0412 ; }
  revision 2020-08-06 { reference "CR-0333"; }
  revision 2020-06-03 { reference "CR-0286"; }
  revision 2019-10-25 { reference "S5-194457 S5-193518"; }
  revision 2019-05-31 {reference "Ericsson refactoring."; }
  revision 2018-08-07 { reference "Initial revision";}

  grouping SMFFunctionGrp {
    description "Represents the SMFFuntion IOC";
    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;
    }

    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";
      key "sd sst";
      uses types5g3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      max-elements 1;
      uses types3gpp:ManagedNFProfile;
    }

    list commModelList {
      min-elements 1;
      key "groupId";
      description "Specifies a list of commModel. It can be used by NF and
        NF services to interact with each other in 5G Core network ";
      reference "3GPP TS 23.501";
      uses types5g3gpp:CommModel;
    }

    leaf configurable5QISetRef {
      type types3gpp:DistinguishedName;
      description "DN of the Configurable5QISet that the SMFFunction supports
        (is associated to).";
    }

    leaf dynamic5QISetRef {
      type types3gpp:DistinguishedName;
      description "DN of the Dynamic5QISet 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.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";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  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 2020-11-05 { reference CR-0412 ; }
  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }
  revision 2019-05-22 { reference "initial revision";}

  grouping UDMFuntionGrp {
    description "Represents the UDMFuntion IOC";
```

```
    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;
    }

    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";
      key "sd sst";
      uses types5g3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      max-elements 1;
      uses types3gpp:ManagedNFProfile;
    }

    list commModelList {
      min-elements 1;
      key "groupId";
      description "Specifies a list of commModel. It can be used by NF and
        NF services to interact with each other in 5G Core network ";
      reference "3GPP TS 23.501";
      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.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; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
```

```
  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "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 2020-11-05 { reference CR-0412 ; }
  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

  revision 2019-05-22 {reference "initial revision"; }

  grouping UDRFuntionGrp {
    description "Representse the UDRFuntion IOC";
    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;
    }

    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";
      key "sd sst";
      uses types5g3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      max-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.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; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "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 2020-11-05 { reference CR-0412 ; }
  revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

  revision 2019-05-22 { reference "initial revision"; }

  grouping UDSFFuntionGrp {
    description "Represents the UDSFFuntion IOC";
    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;
    }

    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";
      key "sd sst";
      uses types5g3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      max-elements 1;
      description "Managed Network Function profile";
      reference "3GPP TS 23.501";
      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.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; }

  organization "3GPP SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "UPFFunction derived from basic ManagedFunction.";
  reference "3GPP TS 28.541 5G Network Resource Model (NRM)";

  revision 2020-11-05 { reference CR-0412 ; }
  revision 2019-10-25 { reference "S5-194457 S5-193518"; }
  revision 2019-05-31 { reference "Ericsson refactoring."; }
  revision 2018-08-07 { reference "Initial revision"; }

  grouping UPFFunctionGrp {
    description "Represents the UPFFunction IOC";
    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;
    }

    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";
      key "sd sst";
      uses types5g3gpp:SNssai;
    }

    list managedNFProfile {
      key idx;
      min-elements 1;
      max-elements 1;
      reference "3GPP TS 23.003";
      uses types3gpp:ManagedNFProfile;
    }

    leaf-list supportedBMOList {
      type string;
      description "List of supported BMOs (Bridge Managed Objects) required
        for integration with TSN system.";
    }
  }

  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.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-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.yang

```
<CODE BEGINS>
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-top { prefix top3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "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 2022-01-07 { reference CR-0643; }
  revision 2020-11-06 { reference CR-0412 ; }
  revision 2019-10-20 { reference "initial revision"; }

  grouping NEFFunctionGrp {
    description "Represents the NEFFunction IOC";
    uses mf3gpp:ManagedFunctionGrp;

    leaf sBIFQDN {
      description "The FQDN of the registered NF instance in the
        service-based interface.";
      type inet:domain-name;
    }

    list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of supporting.
        (Single Network Slice Selection Assistance Information)
        An S-NSSAI has an SST (Slice/Service type) and an optional SD
        (Slice Differentiator) field.";
      key "sd sst";
      uses types5g3gpp:SNssai;
    }

    leaf-list capabilityList {
      description "List of supported capabilities of the NEF.";
      reference "3GPP TS 23.003";
      type string;
    }

    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;
      }
    }
  }
}
<CODE ENDS>
```

H.5.28 module _3gpp-5gc-nrm-QFQoSMonitoringControl.yang

```
<CODE BEGINS>
module _3gpp-5gc-nrm-QFQoSMonitoringControl {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-QFQoSMonitoringControl;
  prefix qFQMCtrl3gpp;

  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-5gc-nrm-smffunction { prefix smf3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }

  organization "3gpp SA5";  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--
officials.htm?Itemid=464";
  description "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 2020-11-05 { reference CR-0412 ; }
  revision 2020-08-03 { reference "CR-0321"; }
  revision 2020-04-10 { reference "S5-202101";   }
```

```
  grouping QFPacketDelayThresholdsTypeGrp {
    description "Represents the QFPacketDelayThresholdsType";
    leaf thresholdDl {
      type uint32;
      units milliseconds;
      description "Downlink threshold";
    }

    leaf thresholdUl {
      type uint32;
      units milliseconds;
      description "Uplink threshold";
     }

    leaf thresholdRtt {
      type uint32;
      units milliseconds;
      description "Round trip threshold";
    }
  }

  grouping QFQoSMonitoringControlGrp {
    description "Represents the QFQoSMonitoringControl IOC.";
    reference "3GPP TS 28.541";

    leaf qFQoSMonitoringState {
      description "The state of QoS monitoring per QoS flow per UE.";
      mandatory true;
      type enumeration {
        enum ENABLED;
        enum DISABLED;
      }
    }

    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";
      key "sd sst";
      uses types5g3gpp: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;
    }

    list qFPacketDelayThresholds {
      key "idx";
      min-elements 1;
```

```
      max-elements 1;
      description "It specifies the thresholds for reporting the packet delay
        between PSA and UE for QoS monitoring per QoS flow per UE.";

      leaf idx { type uint32 ; }
      uses QFPacketDelayThresholdsTypeGrp;
    }

    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.";
      type uint32;
    }

    leaf qFMeasurementPeriod {
      description "It specifies the period (in seconds) for reporting the
        packet delay for QoS monitoring per QoS flow per UE.";
      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;
      }
    }
  }
}
<CODE ENDS>
```

H.5.29 module _3gpp-5gc-nrm-GtpUPathQoSMonitoringControl.yang

```
<CODE BEGINS>
module _3gpp-5gc-nrm-GtpUPathQoSMonitoringControl {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-GtpUPathQoSMonitoringControl;
  prefix gtpUPathQMCtrl3gpp;

  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-5gc-nrm-smffunction { prefix smf3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  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 2020-11-05 { reference CR-0412 ; }
  revision 2020-09-30 { reference "CR-0393"; }
  revision 2020-08-03 { reference "CR-0321"; }
  revision 2020-04-10 { reference "S5-202103"; }

  grouping GtpUPathDelayThresholdsType {
    description "Thresholds for reporting the packet delay for GTP-U path QoS
      monitoring ";
    reference "3GPP TS 29.244";
    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;
    }
  }

  grouping GtpUPathQoSMonitoringControlGrp {
    description "Represents the GtpUPathQoSMonitoringControl IOC.";

    leaf gtpUPathQoSMonitoringState {
      description "The state of GTP-U path QoS monitoring.";
      mandatory true;
      type enumeration {
        enum ENABLED;
        enum DISABLED;
      }
    }

    list gtpUPathMonitoredSNSSAIs {
      key "sd sst";
      description "The S-NSSAIs for which the the GTP-U path QoS monitoring is
        to be performed.";
      reference "3GPP TS 23.003";
      uses types5g3gpp: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;
    }

    list gtpUPathDelayThresholds {
      key n3AveragePacketDelayThreshold;
      // if max-elements is increased later, the key may need to be modified
      min-elements 1;
      max-elements 1;
      description "It specifies the thresholds for reporting the packet delay
        for the GTO-U path QoS monitoring.";
      uses 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.";
      type uint32;
    }

    leaf gtpUPathMeasurementPeriod {
      description "It specifies the period (in seconds) for reporting the packet
        delay for GTP-U path QoS monitoring.";
      type uint32;
    }
  }

  augment "/me3gpp:ManagedElement/smf3gpp:SMFFunction" {

    list GtpUPathQoSMonitoringControl {
      description "Specifies the capabilities and properties for control of
        GTP-U path QoS monitoring. For more information about the GTP-U path
        QoS monitoring.";
      reference "3GPP TS 23.501";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
        uses GtpUPathQoSMonitoringControlGrp;
      }
    }
  }
}
<CODE ENDS>
```

H.5.30 module _3gpp-5gc-nrm-configurable5QISet.yang

```
<CODE BEGINS>
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-common-subnetwork { prefix subnet3gpp; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "This IOC represents the configurable 5QIs, including
    their QoS characteristics, that need to be pre-configured
    (and configurable) to the 5G NFs.";
  reference "3GPP TS 28.541";

  revision 2022-07-27 { reference "CR-0769"; }
  revision 2022-04-29 { reference "CR-0729"; }
  revision 2022-01-07 { reference CR-0643; }
  revision 2020-08-04 { reference "CR-0321"; }
  revision 2020-06-03 { reference "CR-0286"; }

  grouping PacketErrorRateGrp {
    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 FiveQICharacteristicsGrp {
  description "Represents the FiveQICharacteristics IOC.";
  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 ;
    }
    mandatory true;
    description "It indicates the Priority Level of a 5QI, as specified
      in TS 23.501.";
  }

  leaf packetDelayBudget {
    type uint32 {
      range 0..1023 ;
    }
    mandatory true;
    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 1;
    max-elements 1;
    uses PacketErrorRateGrp;
    description "It indicates the Packet Error Rate of a 5QI,
      as specified in TS 23.501.";
  }

  leaf averagingWindow {
    type uint32 {
      range 0..4095 ;
    }
    mandatory true;
    units ms;
    reference "TS 23.501";
  }

  leaf maximumDataBurstVolume {
    type uint32{
      range 0..4095 ;
    }
    mandatory true;
    units byte;
  }
}

grouping Configurable5QISetGrp {
  description "Represents the Configurable5QISet IOC.
    No attributes defined.";
}

grouping FiveQICharacteristicsSubtree {
  list FiveQICharacteristics {
    description "This specifies the 5QI value and the corresponding
      QoS characteristics for a 5QI.";
    key id;
    uses top3gpp:Top_Grp;
    container attributes {
```

```
        uses FiveQICharacteristicsGrp;
      }
    }
  }

  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;
      }
      uses FiveQICharacteristicsSubtree;
    }
  }
  }
}
<CODE ENDS>
```

H.5.31 module _3gpp-5gc-nrm-FiveQiDscpMappingSet.yang

```
<CODE BEGINS>
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; }

  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 2020-08-03 { reference "CR-0321"; }
  revision 2020-05-27 { reference "CR-0287"; }

  grouping FiveQiDscpMapping {
    leaf-list fiveQIValues {
      type uint32 {
        range 0..255 ;
      }
      min-elements 1;
      description " Identifies the 5QI values that are mapped to a same DSCP";
  }

    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;
  }
}
<CODE ENDS>
```

H.5.32 module _3gpp-5gc-nrm-PredefinedPccRuleSet.yang

```
module _3gpp-5gc-nrm-predefinedpccruleset {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-predefinedpccruleset;
  prefix PredPccRules3gpp;

  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-5gc-nrm-smffunction { prefix smf3gpp; }
  import _3gpp-5gc-nrm-pcffunction { prefix pcf3gpp; }
  import ietf-yang-types { prefix yang; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "This IOC represents the predefined PCC rules, which are
    configured to SMF and referenced by PCF.";
  reference "3GPP TS 28.541";

  revision 2020-09-30 { reference "CR-0393"; }
  revision 2020-08-21 { reference "CR-0330"; }

  grouping TscaiInputContainer {
    description "It specifies the transports TSCAI input parameters for TSC
      traffic at the ingress interface of the DS-TT/UE for a PCC rule.";
    reference " 3GPP TS 29.512";
    leaf periodicity {
      type uint32;
      description "It identifies the time period between the start of two bursts
        in reference to the TSN GM.";
      reference "3GPP TS 29.571.";
    }
    leaf burstArrivalTime {
      type yang:date-and-time;
      description "It Indicates the arrival time (in date-time format) of the
        data burst in reference to the TSN GM.";
      reference "3GPP,TS 29.571.";
    }
  }

  grouping ConditionData {
    description "It specifies the specifies the condition data for a PCC rule.";
    leaf condId {
      type string;
      mandatory true;
      description "It uniquely identifies the condition data.";
    }
    leaf activationTime {
      type yang:date-and-time;
      description " It indicates the time (in date-time format) when the decision
        data shall be activated.";
      reference "3GPP29.512 and TS 29.571.";
    }
    leaf deactivationTime {
      type yang:date-and-time;
      description "It indicates the time (in date-time format) when the decision
        data shall be deactivated.";
      reference "3GPPTS 29.512 and TS 29.571.";
    }
    leaf accessType {
      type enumeration {
        enum 3GPP_ACCESS;
        enum NON_3GPP_ACCESS;
      }
      description "It provides the condition of access type of the UE when the
        session AMBR shall be enforced.";
```

```
      reference "3GPPTS 29.512.";
    }
    leaf ratType {
      type enumeration {
        enum NR;
        enum EUTRA;
        enum WLAN;
        enum VIRTUAL;
        enum NBIOT;
        enum WIRELINE;
        enum WIRELINE_CABLE;
        enum WIRELINE_BBF;
        enum LTE-M;
        enum NR_U;
        enum EUTRA_U;
        enum TRUSTED_N3GA;
        enum TRUSTED_WLAN;
        enum UTRA;
        enum GERA;
      }
      description "It provides the condition of RAT type of the UE when the
        session AMBR shall be enforced.";
      reference "3GPPTS 29.512 and TS 29.571.";
    }
  }

  grouping SteeringMode {
    description "It specifies the traffic distribution rule, see TS 29.512.";
    leaf steerModeValue {
      type enumeration {
        enum ACTIVE_STANDBY;
        enum LOAD_BALANCING;
        enum SMALLEST_DELAY;
        enum PRIORITY_BASED;
      }
      mandatory true;
      description "It indicates the value of the steering mode, see TS 29.512.";
    }
    leaf active {
      type enumeration {
        enum 3GPP_ACCESS;
        enum NON_3GPP_ACCESS;
      }
      description "It indicates the active access, see TS 29.571.";
    }
    leaf standby {
      type enumeration {
        enum 3GPP_ACCESS;
        enum NON_3GPP_ACCESS;
      }
      description "It indicates the Standby access, see TS 29.571.";
    }
    leaf threeGLoad {
      type uint8 {
        range 0..100;
      }
      description "It indicates the traffic load to steer to the 3GPP Access
        expressed in one percent.";
    }
    leaf prioAcc {
      type enumeration {
        enum 3GPP_ACCESS;
        enum NON_3GPP_ACCESS;
      }
      description "It indicates the high priority access.";
        reference "3GPPTS 29.571";
    }
  }

  grouping UpPathChgEvent {
    description "It specifies the information about the AF subscriptions of the
      UP path change.";
    reference "3GPPTS 29.512";
    leaf notificationUri {
      type string;
      mandatory true;
      description "It provides notification address (Uri) of AF receiving the
        event notification.";
```

```
    }
    leaf notifCorreId {
      type string;
      mandatory true;
      description "It is used to set the value of Notification Correlation ID in
        the notification sent by the SMF, see TS 29.512";
    }
    leaf dnaiChgType {
      type enumeration {
        enum EARLY;
        enum EARLY_LATE;
        enum LATE;
      }
      mandatory true;
      description "It indicates the type of DNAI change, see TS 29.512";
    }
    leaf afAckInd {
      type boolean;
      default false;
      description "It identifies whether the AF acknowledgement of UP path
      event notification is expected.";
    }
  }

  grouping RouteInformation {
    description "It specifies the traffic routing information.";
    leaf ipv4Addr {
      type string;
      description "It defines the Ipv4 address of the tunnel end point in the
        data network, formatted in the dotted decimal notation.";
    }
    leaf ipv6Addr {
      type string;
      description "It defines the Ipv6 address of the tunnel end point in the
        data network.";
    }
    leaf portNumber {
      type uint32;
      mandatory true;
      description " It defines the UDP port number of the tunnel end point in
        the data network, see TS 29.571";
    }
  }

  grouping RouteToLocation {
    description "It specifies a list of location which the traffic shall be
      routed to for the AF request.";
    leaf dnai {
      type string;
      mandatory true;
      description "It represents the DNAI (Data network access identifier).";
      reference "3GPP 3GPP TS 23.501";
    }
    container routeInfo{
      description "It provides the traffic routing information.";
      uses RouteInformation;
    }
    leaf routeProfId {
      type string;
      description "It identifies the routing profile.";
    }
  }

  grouping RedirectInformaton {
    description "It specifies the redirect information for traffic control in
      the PCC rule.";
    leaf redirectEnabled {
      type boolean;
      mandatory true;
      description "It indicates whether the redirect instruction is enabled.";
    }
    leaf redirectAddressType {
      type enumeration {
        enum IPV4_ADDR;
        enum IPV6_ADDR;
        enum URL;
        enum SIP_URI;
      }
```

```
      mandatory true;
      description "It indicates the type of redirect address.";
      reference "3GPPTS 29.512";
    }
    leaf redirectServerAddress {
      type string;
      mandatory true;
      description "It indicates the address of the redirect server.";
    }
  }

  grouping TrafficControlDataInformation {
    description "It specifies the traffic control data for a service
      flow of a PCC rule.";
    leaf tcId {
      type string;
      mandatory true;
      description "It univocally identifies the traffic control policy data
        within a PDU session.";
    }
    leaf flowStatus {
      type enumeration {
        enum ENABLED-UPLINK;
        enum ENABLED-DOWNLINK;
        enum ENABLED;
        enum DISABLED;
        enum REMOVED;
      }
      mandatory true;
      description "It represents whether the service data flow(s) are enabled
        or disabled.";
    }
    container redirectInfo {
      description "It contains the redirect information indicating whether the
        detected application traffic should be redirected to another controlled
        address.";
      uses RedirectInformaton;
    }
    container addRedirectInfo {
      description "It contains the additional redirect information indicating
        whether the detected application traffic should be redirected to another
        controlled address.";
      list redirectInfo {
        description "The list of redirect information indicating whether the
          detected application traffic should be redirected to another
          controlled address.";
        key "redirectServerAddress";
        uses RedirectInformaton;
      }
    }
    leaf muteNotif {
      type boolean;
      default false;
      description "It indicates whether applicat'on's start or stop notification
        is to be muted.";
    }
    leaf trafficSteeringPolIdDl {
      type string;
      description "It references to a pre-configured traffic steering policy for downlink traffic at
the SMF, see TS 29.512";
    }
    leaf trafficSteeringPolIdUl {
      type string;
      mandatory false;
      description "It references to a pre-configured traffic steering policy for
        uplink traffic at the SMF, see TS 29.512";
    }
    container routeToLocs {
      description "It provides a list of location which the traffic shall be
       routed to for the AF request.";
      list routeToLoc {
        description "The list of location which the traffic shall be routed to
          for the AF request.";
        key "dnai";
        uses RouteToLocation;
      }
    }
    uses UpPathChgEvent;
```

```
    leaf steerFun {
      type enumeration {
        enum MPTCP;
        enum ATSSS_LL;
      }
      description "It indicates the applicable traffic steering functionality.";
      reference "3GPPTS 29.512";
    }
    container steerModeDl {
      description "It provides the traffic distribution rule across 3GPP and
        Non-3GPP accesses to apply for downlink traffic.";
      uses SteeringMode;
    }
    container steerModeUl {
      description "It provides the traffic distribution rule across 3GPP and Non-3GPP accesses to
apply for uplink traffic.";
      uses SteeringMode;
    }
    leaf mulAccCtrl {
      type enumeration {
        enum ALLOWED;
        enum NOT_ALLOWED;
      }
      description "It indicates whether the service data flow, corresponding to the service data
flow template, is allowed or not allowed.";
    }
  }

  grouping ARP {
    description "It specifies the allocation and retention priority of a QoS control policy.";
    leaf priorityLevel {
      type uint8 {
        range 1..15;
      }
      mandatory true;
      description "It defines the relative importance of a resource request.";
    }
    leaf preemptCap {
      type enumeration {
        enum NOT_PREEMPT;
        enum MAY_PREEMPT;
      }
      mandatory true;
      description "It defines whether a service data flow may get resources that were already
assigned to another service data flow with a lower priority level.";
    }
    leaf preemptVuln {
      type enumeration {
        enum NOT_PREEMPTABLE;
        enum PREEMPTABLE;
      }
      mandatory true;
      description "It defines whether a service data flow may lose the resources assigned to it in
order to admit a service data flow with higher priority level.";
    }
  }

  grouping QosDataInformation {
    description "It specifies the QoS control policy data for a service flow of a PCC rule.";
    leaf qosId {
      type string;
      mandatory true;
      description "It identifies the QoS control policy data for a PCC rule.";
    }
    leaf fiveQIValue {
      type uint8 {
        range 0..255;
      }
      mandatory true;
      description "It indicates the 5QI value.";
    }
    leaf maxbrUl {
      type string;
      description "It represents the maximum uplink bandwidth.";
    }
    leaf maxbrDl {
      type string;
      description "It represents the maximum downlink bandwidth.";
```

```
    }
    leaf gbrUl {
      type string;
      description "It represents the guaranteed uplink bandwidth.";
    }
    leaf gbrDl {
      type string;
      description "It represents the guaranteed downlink bandwidth.";
    }
    uses ARP;
    leaf qosNotificationControl {
      type boolean;
      default false;
      description "It indicates whether notifications are requested from 3GPP NG-RAN when the GFBR
can no longer (or again) be guaranteed for a QoS Flow during the lifetime of the QoS Flow.";
    }
    leaf reflectiveQos {
      type boolean;
      default false;
      description "Indicates whether the QoS information is reflective for the corresponding non-GBR
service data flow";
    }
    leaf sharingKeyDl {
      type string;
      description "It indicates, by containing the same value, what PCC rules may share resource in
downlink direction.";
    }
    leaf sharingKeyUl {
      type string;
      description "It indicates, by containing the same value, what PCC rules may share resource in
uplink direction.";
    }
    leaf maxPacketLossRateDl {
      type uint16 {
        range 0..1000;
      }
      description "It indicates the downlink maximum rate for lost packets that can be tolerated for
the service data flow.";
    }
    leaf maxPacketLossRateUl {
      type uint16 {
        range 0..1000;
      }
      description "It indicates the uplink maximum rate for lost packets that can be tolerated for
the service data flow.";
    }
    leaf extMaxDataBurstVol {
      type uint32 {
        range 4096..2000000;
      }
      description "It denotes the largest amount of data that is required to be transferred within a
period of 5G-AN PDB, see TS 29.512";
    }
  }

  grouping EthFlowDescription {
    description "It describes an Ethernet flow.";
    leaf destMacAddr {
      type string;
      mandatory true;
      description "It specifies the destination MAC address formatted in the
        hexadecimal .";
      reference "clause 1.1 and clause 2.1 of IETF RFC";
    }
    leaf ethType {
      type string;
      mandatory true;
      description "A two-octet string that represents the Ethertype.";
      reference "IEEE 802.3 and IETF RFC 7042 in hexadecimal representation.";
    }
    leaf fDesc {
      type string;
      description "It contains the flow description for the Uplink or Downlink IP flow. It shall be
present when the ethtype is IP.";
    }
    leaf fDir {
      type enumeration {
        enum DOWNLINK;
```

```
        enum UPLINK;
      }
      mandatory true;
      description "It indicates the packet filter direction.";
    }
    leaf sourceMacAddr {
      type string;
      mandatory true;
      description "It specifies the source MAC address formatted in the
        hexadecimal notation.";
      reference "clause 1.1 and clause 2.1 of IETF RFC 7042";
    }
    leaf-list vlanTags {
      type string;
      description "It specifies the Customer-VLAN and/or Service-VLAN tags
        containing the VID, PCP/DEI fields as defined in IEEE 802.1Q and
        IETF RFC 7042. The first/lower instance in the array stands for the
        Customer-VLAN tag and the second/higher instance in the array stands
        for the Service-VLAN tag.";
    }
    leaf srcMacAddrEnd {
      type string;
      description "It specifies the source MAC address end. If this attribute is present, the
sourceMacAddr attribute specifies the source MAC address start. E.g. srcMacAddrEnd with value 00-10-
A4-23-3E-FE and sourceMacAddr with value 00-10-A4-23-3E-02 means all MAC addresses from 00-10-A4-23-
3E-02 up to and including 00-10-A4-23-3E-FE.";
    }
    leaf destMacAddrEnd {
      type string;
      description "It specifies the destination MAC address end. If this attribute is present, the
destMacAddr attribute specifies the destination MAC address start.";
    }
  }

  grouping FlowInformation {
    description "It specifies the flow information of a PCC rule.";
    leaf flowDescription {
      type string;
      mandatory true;
      description "It defines a packet filter for an IP flow.";
    }
    uses EthFlowDescription;
    leaf packFiltId {
      type string;
      mandatory true;
      description "It is the identifier of the packet filter.";
    }
    leaf packetFilterUsage {
      type boolean;
      default false;
      description "It indicates if the packet shall be sent to the UE.";
    }
    leaf tosTrafficClass {
      type string;
      mandatory true;
      description "It contains the Ipv4 Type-of-Service and mask field or the Ipv6 Traffic-Class
field and mask field.";
    }
    leaf spi {
      type string;
      mandatory true;
      description "It is the security parameter index of the IPSec packet.";
      reference "IETF RFC 4301";
    }
    leaf flowLabel {
      type string;
      description "It specifies the Ipv6 flow label header field.";
    }
    leaf flowDirection {
      type enumeration {
        enum DOWNLINK;
        enum UPLINK;
        enum BIDIRECTIONAL;
        enum UNSPECIFIED;
      }
      mandatory true;
      description "It indicates the direction/directions that a filter is applicable.";
    }
```

```
}

grouping PccRule {
  description "It specifies the PCC rule, see TS 29.512";
  leaf pccRuleId {
    type string;
    mandatory true;
    description "It identifies the PCC rule.";
  }
  container flowInfoList {
    description "It is a list of IP flow packet filter information.";
    list flowInfo {
      description "The list of IP flow packet filter information.";
      key "packFiltId";
      uses FlowInformation;
    }
  }
  leaf applicationId {
    type string;
    default false;
    description "A reference to the application detection filter configured
      at the UPF.";
  }
  leaf appDescriptor {
    type string;
    description "It is the ATSSS rule application descriptor.";
  }
  leaf contentVersion {
    type uint8;
    description "Indicates the content version of the PCC rule.";
  }
  leaf precedence {
    type uint8 {
      range 0..255;
    }
    description "It indicates the order in which this PCC rule is applied
      relative to other PCC rules within the same PDU session.";
  }
  leaf afSigProtocol {
    type enumeration {
      enum NO_INFORMATION;
      enum SIP;
    }
    description "Indicates the protocol used for signalling between the UE
      and the AF, the default value is NO_INFORMATION.";
  }
  leaf isAppRelocatable {
    type boolean;
    default false;
    mandatory false;
    description "It indicates the application relocation possibility, the
      default value is NO_INFORMATION.";
  }
  leaf isUeAddrPreserved {
    type boolean;
    default false;
    description "It Indicates whether UE IP address should be preserved.";
  }
  container qosData {
    description "It contains the QoS control policy data for a PCC rule.";
    list qosDataInfo {
      description "The list of QoS control policy data.";
      key "qosId";
      uses QosDataInformation;
    }
  }
  container altQosParams {
    description "It contains the QoS control policy data for the Alternative
      QoS parameter sets of the service data flow.";
    list qosDataInfo {
      description "The list of QoS control policy data.";
      key "qosId";
      uses QosDataInformation;
    }
  }
  container trafficControlData {
    description "It contains the traffic control policy data for a PCC rule.";
    list trafficControlDataInfo {
```

```
        description "The list of traffic control policy data.";
        key "tcId";
        uses TrafficControlDataInformation;
      }
    }
    uses ConditionData;
    container tscaiInputUl {
      description "It contains transports TSCAI input parameters for TSC traffic at the ingress
interface of the DS-TT/UE (uplink flow direction).";
      uses TscaiInputContainer;

    }
    container tscaiInputDl {
      description "It contains transports TSCAI input parameters for TSC traffic at the ingress of
the NW-TT (downlink flow direction).";
      uses TscaiInputContainer;
    }
  }

  grouping PredefinedPccRuleSetGrp {
    description "Represents the PredefinedPccRuleSet IOC.";
    list PredefinedPccRules {
      description "The list of predefined PCC rules.";
      key "pccRuleId";
      uses PccRule;
    }
  }

  grouping PredefinedPccRuleSetSubtree {
    description "It specifies the PredefinedPccRuleSet IOC with inherited attributes.";
    list PredefinedPccRuleSet {
      description "Specifies the predefined PCC rules.";
      key "id";
      uses top3gpp:Top_Grp;
      container attributes {
        description "It contains the attributes defined specifically in the PredefinedPccRuleSet
IOC.";
        uses PredefinedPccRuleSetGrp;
      }
    }
  }

  augment "/me3gpp:ManagedElement/smf3gpp:SMFFunction" {
    description "It specifies the containment relation of PredefinedPccRuleSet MOI with SMFFunction
MOI.";
    uses PredefinedPccRuleSetSubtree;
  }

  augment "/me3gpp:ManagedElement/pcf3gpp:PCFFunction" {
    description "It specifies the containment relation of PredefinedPccRuleSet MOI with PCFFunction
MOI.";
    uses PredefinedPccRuleSetSubtree;
  }
}
```

H.5.33 module _3gpp-5gc-nrm-dynamic5QISet.yang

```
<CODE BEGINS>
module _3gpp-5gc-nrm-dynamic5qiset {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-5gc-nrm-dynamic5qiset;
  prefix dyn5QIs3gpp;

  import _3gpp-common-top { prefix top3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-managed-element { prefix me3gpp; }
  import _3gpp-5gc-nrm-configurable5qiset { prefix Conf5QIs3gpp; }

  organization "3gpp SA5";
  contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "This IOC represents the dynamic 5QIs including their QoS
    characteristics.";
  reference "3GPP TS 28.541";
```

```
  revision 2022-07-27 { reference "CR-0769"; }
  revision 2022-01-07 { reference CR-0643; }
  revision 2020-10-01 { reference "CR-0393"; }
  revision 2020-08-06 { reference "CR-0333"; }

  grouping Dynamic5QISetGrp {
    description "Represents the Dynamic5QISet IOC.";
    list dynamic5QIs {
      description "This IOC specifies the dynamically assigned 5QIs
        including their QoS characteristics, see 3GPP TS 23.501.
        The instance of this IOC shall not be created or modified by the
        MnS consumer except for the instance associated to
        PCFFunction MOI or SMFFunction MOI when the PCF is not deployed.";
      key id;
      uses top3gpp:Top_Grp;
      container attributes {
         uses Conf5QIs3gpp:FiveQICharacteristicsGrp;
      }
    }
  }

  grouping Dynamic5QISetSubtree {
    description "Helps augmenting Dynamic5QISet into multiple places.";
    list Dynamic5QISet {
      description "Specifies the dynamic 5QIs including their QoS
        characteristics, see 3GPP TS 23.501.";
      key "id";
      uses top3gpp:Top_Grp;
      container attributes {
        uses Dynamic5QISetGrp;
      }
      uses Conf5QIs3gpp:FiveQICharacteristicsSubtree;
    }
  }

  augment "/subnet3gpp:SubNetwork" {
    uses Dynamic5QISetSubtree;
  }

  augment "/me3gpp:ManagedElement" {
    uses Dynamic5QISetSubtree;
  }
}
<CODE ENDS>
```

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): Void

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

J.1 General

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

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

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

J.2 Void

J.3 Void

J.4 Solution Set (SS) definitions

J.4.1 Void

J.4.2 Void

J.4.3 OpenAPI document "TS28541_SliceNrm.yaml"


```
openapi: 3.0.1
info:
  title: Slice NRM
  version: 17.7.0
  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; 5G NRM, Slice NRM
  url: http://www.3gpp.org/ftp/Specs/archive/28_series/28.541/
paths: {}
components:
  schemas:

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

    Float:
      type: number
      format: float
    MobilityLevel:
      type: string
      enum:
        - STATIONARY
        - NOMADIC
        - RESTRICTED MOBILITY
        - FULLY MOBILITY
    SynAvailability:
      type: string
      enum:
        - NOT SUPPORTED
        - BETWEEN BS AND UE
        - BETWEEN BS AND UE & UE AND UE
    PositioningAvailability:
```

```
          type: array
          items:
            type: string
            enum:
              - CIDE-CID
              - OTDOA
              - RF FINGERPRINTING
              - AECID
              - HYBRID POSITIONING
              - NET-RTK
        Predictionfrequency:
          type: string
          enum:
            - PERSEC
            - PERMIN
            - PERHOUR
        SharingLevel:
          type: string
          enum:
            - SHARED
            - NON-SHARED

        NetworkSliceSharingIndicator:
          type: string
          enum:
            - SHARED
            - NON-SHARED

        SliceSimultaneousUse:
          type: string
          enum:
            - ZERO
            - ONE
            - TWO
            - THREE
            - FOUR
        Category:
          type: string
          enum:
            - CHARACTER
            - SCALABILITY
        Tagging:
          type: array
          items:
            type: string
            enum:
              - PERFORMANCE
              - FUNCTION
              - OPERATION
        Exposure:
          type: string
          enum:
            - API
            - KPI
        ServAttrCom:
          type: object
          properties:
            category:
              $ref: '#/components/schemas/Category'
            tagging:
              $ref: '#/components/schemas/Tagging'
            exposure:
              $ref: '#/components/schemas/Exposure'
        Support:
          type: string
          enum:
            - NOT SUPPORTED
            - SUPPORTED
        DelayTolerance:
          type: object
          properties:
            servAttrCom:
              $ref: '#/components/schemas/ServAttrCom'
            support:
              $ref: '#/components/schemas/Support'
        DeterministicComm:
          type: object
          properties:
```

```
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        availability:
          $ref: '#/components/schemas/Support'
        periodicityList:
          type: string
    XLThpt:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        guaThpt:
          $ref: '#/components/schemas/Float'
        maxThpt:
          $ref: '#/components/schemas/Float'
    MaxPktSize:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        maxsize:
          type: integer
    MaxNumberofPDUSessions:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        nOofPDUSessions:
          type: integer
    KPIMonitoring:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        kPIList:
          type: string
    NBIoT:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        support:
          $ref: '#/components/schemas/Support'
    RadioSpectrum:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        nROperatingBands:
          type: string
    Synchronicity:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        availability:
          $ref: '#/components/schemas/SynAvailability'
        accuracy:
          $ref: '#/components/schemas/Float'
    SynchronicityRANSubnet:
      type: object
      properties:
        availability:
          $ref: '#/components/schemas/SynAvailability'
        accuracy:
          $ref: '#/components/schemas/Float'
    Positioning:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        availability:
          $ref: '#/components/schemas/PositioningAvailability'
        predictionfrequency:
          $ref: '#/components/schemas/Predictionfrequency'
        accuracy:
          $ref: '#/components/schemas/Float'
    PositioningRANSubnet:
```

```
      type: object
      properties:
        availability:
          $ref: '#/components/schemas/PositioningAvailability'
        predictionfrequency:
          $ref: '#/components/schemas/Predictionfrequency'
        accuracy:
          $ref: '#/components/schemas/Float'
    UserMgmtOpen:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        support:
          $ref: '#/components/schemas/Support'
    V2XCommModels:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        v2XMode:
          $ref: '#/components/schemas/Support'
    TermDensity:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        density:
          type: integer
    NsInfo:
      type: object
      properties:
        nsInstanceId:
          type: string
        nsName:
          type: string
    EmbbEEPerfReq:
      type: object
      properties:
        kpiType:
          type: string
          enum:
            - NUMOFBITS
            - NUMOFBITS_RANBASED
        req:
          type: number
    UrllcEEPerfReq:
      type: object
      properties:
        kpiType:
          type: string
          enum:
            - INVOFLATENCY
            - NUMOFBITS_MULTIPLIED_INVOFLATENCY
        req:
          type: number
    MIoTEEPerfReq:
      type: object
      properties:
        kpiType:
          type: string
          enum:
            - MAXREGSUBS
            - MEANACTIVEUES
        req:
          type: number
    EEPerfReq:
      oneOf:
        - $ref: '#/components/schemas/EmbbEEPerfReq'
        - $ref: '#/components/schemas/UrllcEEPerfReq'
        - $ref: '#/components/schemas/MIoTEEPerfReq'
    EnergyEfficiency:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        performance:
          $ref: '#/components/schemas/EEPerfReq'
```

```
    NSSAASupport:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        support:
          $ref: '#/components/schemas/Support'
    SecFunc:
      type: object
      properties:
        secFunId:
          type: string
        secFunType:
          type: string
        secRules:
          type: array
          items:
            type: string
    N6Protection:
      type: object
      properties:
        servAttrCom:
          $ref: '#/components/schemas/ServAttrCom'
        secFuncList:
          type: array
          items:
            $ref: '#/components/schemas/SecFunc'

    CNSliceSubnetProfile:
      type: object
      properties:
        maxNumberofUEs:
          type: integer
        dLLatency:
          type: number
        uLLatency:
          type: number
        dLThptPerSliceSubnet:
          $ref: '#/components/schemas/XLThpt'
        dLThptPerUE:
          $ref: '#/components/schemas/XLThpt'
        uLThptPerSliceSubnet:
          $ref: '#/components/schemas/XLThpt'
        uLThptPerUE:
          $ref: '#/components/schemas/XLThpt'
        maxNumberOfPDUSessions:
          type: integer
        coverageAreaTAList:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/NrTacList'
        resourceSharingLevel:
          $ref: '#/components/schemas/SharingLevel'
        dLMaxPktSize:
          type: integer
        uLMaxPktSize:
          type: integer
        delayTolerance:
          $ref: '#/components/schemas/DelayTolerance'
        synchronicity:
          $ref: '#/components/schemas/SynchronicityRANSubnet'
        sliceSimultaneousUse:
          $ref: '#/components/schemas/SliceSimultaneousUse'
        reliability:
          type: number
        energyEfficiency:
          type: number
        dLDeterministicComm:
          $ref: '#/components/schemas/DeterministicComm'
        uLDeterministicComm:
          $ref: '#/components/schemas/DeterministicComm'
        survivalTime:
          type: number
        nssaaSupport:
          $ref: '#/components/schemas/NSSAASupport'
        n6Protection:
          $ref: '#/components/schemas/N6Protection'
    RANSliceSubnetProfile:
      type: object
      properties:
```

```
        coverageAreaTAList:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/NrTacList'
        dLLatency:
          type: number
        uLLatency:
          type: number
        uEMobilityLevel:
          $ref: '#/components/schemas/MobilityLevel'
        resourceSharingLevel:
          $ref: '#/components/schemas/SharingLevel'
        maxNumberofUEs:
          type: integer
        activityFactor:
          type: integer
        dLThptPerSliceSubnet:
          $ref: '#/components/schemas/XLThpt'
        dLThptPerUE:
          $ref: '#/components/schemas/XLThpt'
        uLThptPerSliceSubnet:
          $ref: '#/components/schemas/XLThpt'
        uLThptPerUE:
          $ref: '#/components/schemas/XLThpt'
        uESpeed:
          type: integer
        reliability:
          type: number
        sST:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/Sst'
        dLMaxPktSize:
          type: integer
        uLMaxPktSize:
          type: integer
        nROperatingBands:
          type: string
        delayTolerance:
          $ref: '#/components/schemas/DelayTolerance'
        positioning:
          $ref: '#/components/schemas/PositioningRANSubnet'
        sliceSimultaneousUse:
          $ref: '#/components/schemas/SliceSimultaneousUse'
        energyEfficiency:
          type: number
        termDensity:
          $ref: '#/components/schemas/TermDensity'
        survivalTime:
          type: number
        synchronicity:
          $ref: '#/components/schemas/SynchronicityRANSubnet'
        dLDeterministicComm:
          $ref: '#/components/schemas/DeterministicComm'
        uLDeterministicComm:
          $ref: '#/components/schemas/DeterministicComm'
    TopSliceSubnetProfile:
      type: object
      properties:
        dLLatency:
          type: integer
        uLLatency:
          type: integer
        maxNumberofUEs:
          type: integer
        dLThptPerSliceSubnet:
          $ref: '#/components/schemas/XLThpt'
        dLThptPerUE:
          $ref: '#/components/schemas/XLThpt'
        uLThptPerSliceSubnet:
          $ref: '#/components/schemas/XLThpt'
        uLThptPerUE:
          $ref: '#/components/schemas/XLThpt'
        dLMaxPktSize:
          type: integer
        uLMaxPktSize:
          type: integer
        maxNumberOfPDUSessions:
          type: integer
        nROperatingBands:
          type: string
        sliceSimultaneousUse:
```

```
          $ref: '#/components/schemas/SliceSimultaneousUse'
        energyEfficiency:
          $ref: '#/components/schemas/EnergyEfficiency'
        synchronicity:
          $ref: '#/components/schemas/Synchronicity'
        delayTolerance:
          $ref: '#/components/schemas/DelayTolerance'
        positioning:
          $ref: '#/components/schemas/Positioning'
        termDensity:
          $ref: '#/components/schemas/TermDensity'
        activityFactor:
          type: integer
        coverageAreaTAList:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/NrTacList'
        resourceSharingLevel:
          $ref: '#/components/schemas/SharingLevel'
        uEMobilityLevel:
          $ref: '#/components/schemas/MobilityLevel'
        uESpeed:
          type: integer
        reliability:
          type: number
        sST:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/Sst'
        dLDeterministicComm:
          $ref: '#/components/schemas/DeterministicComm'
        uLDeterministicComm:
          $ref: '#/components/schemas/DeterministicComm'
        survivalTime:
          type: number
        nssaaSupport:
          $ref: '#/components/schemas/NSSAASupport'
        n6Protection:
          $ref: '#/components/schemas/N6Protection'



    ServiceProfile:
      type: object
      properties:
          serviceProfileId:
            type: string
          plmnInfoList:
            $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnInfoList'
          maxNumberofUEs:
            type: number
          dLLatency:
            type: number
          uLLatency:
            type: number
          uEMobilityLevel:
            $ref: '#/components/schemas/MobilityLevel'
          sst:
            $ref: 'TS28541_NrNrm.yaml#/components/schemas/Sst'
          networkSliceSharingIndicator:
            $ref: '#/components/schemas/NetworkSliceSharingIndicator'
          availability:
            type: number
          delayTolerance:
            $ref: '#/components/schemas/DelayTolerance'
          dLDeterministicComm:
            $ref: '#/components/schemas/DeterministicComm'
          uLDeterministicComm:
            $ref: '#/components/schemas/DeterministicComm'
          dLThptPerSlice:
            $ref: '#/components/schemas/XLThpt'
          dLThptPerUE:
            $ref: '#/components/schemas/XLThpt'
          uLThptPerSlice:
            $ref: '#/components/schemas/XLThpt'
          uLThptPerUE:
            $ref: '#/components/schemas/XLThpt'
          dLMaxPktSize:
            $ref: '#/components/schemas/MaxPktSize'
          uLMaxPktSize:
            $ref: '#/components/schemas/MaxPktSize'
          maxNumberofPDUSessions:
```

```
          $ref: '#/components/schemas/MaxNumberofPDUSessions'
        kPIMonitoring:
          $ref: '#/components/schemas/KPIMonitoring'
        nBIoT:
          $ref: '#/components/schemas/NBIoT'
        radioSpectrum:
          $ref: '#/components/schemas/RadioSpectrum'
        synchronicity:
          $ref: '#/components/schemas/Synchronicity'
        positioning:
          $ref: '#/components/schemas/Positioning'
        userMgmtOpen:
          $ref: '#/components/schemas/UserMgmtOpen'
        v2XModels:
          $ref: '#/components/schemas/V2XCommModels'
        coverageArea:
          type: string
        termDensity:
          $ref: '#/components/schemas/TermDensity'
        activityFactor:
          $ref: '#/components/schemas/Float'
        uESpeed:
          type: integer
        jitter:
          type: integer
        survivalTime:
          type: number
        reliability:
          type: number
        maxDLDataVolume:
          type: number
        maxULDataVolume:
          type: number
        sliceSimultaneousUse:
          $ref: '#/components/schemas/SliceSimultaneousUse'
        energyEfficiency:
          $ref: '#/components/schemas/EnergyEfficiency'
        nssaaSupport:
          $ref: '#/components/schemas/NSSAASupport'
        n6Protection:
          $ref: '#/components/schemas/N6Protection'
    SliceProfile:
      type: object
      properties:
        serviceProfileId:
          type: string
        plmnInfoList:
          $ref: 'TS28541_NrNrm.yaml#/components/schemas/PlmnInfoList'
        cNSliceSubnetProfile:
          $ref: '#/components/schemas/CNSliceSubnetProfile'
        rANSliceSubnetProfile:
          $ref: '#/components/schemas/RANSliceSubnetProfile'
        topSliceSubnetProfile:
          $ref: '#/components/schemas/TopSliceSubnetProfile'

    IpAddress:
      oneOf:
        - $ref: 'TS28623_ComDefs.yaml#/components/schemas/Ipv4Addr'
        - $ref: 'TS28623_ComDefs.yaml#/components/schemas/Ipv6Addr'

    LogicalInterfaceInfo:
      type: object
      properties:
       logicalInterfaceType:
         type: string
         enum:
          - VLAN
          - MPLS
          - Segment
       logicalInterfaceId:
         type: string

    ServiceProfileList:
       type: array
       items:
        $ref: '#/components/schemas/ServiceProfile'

    SliceProfileList:
```

```
      type: array
      items:
        $ref: '#/components/schemas/SliceProfile'
    FeasibilityResult:
      description: >-
        An attribute which specifies the feasibility check result for the feasibility check and 
reservation job.
      type: string
      enum:
        - FEASIBLE
        - INFEASIBLE
    InFeasibleReason:
      description: >-
        An attribute that specifies the additional reason information if the feasibility check 
result is infeasible.The detailed ENUM value is FFS.
      type: string
    RecommendationRequest:
      description: >-
        An attribute represents MnS consumer's request for recommended network slice related 
requirements.
      type: boolean
    RecommendedRequirements:
      description: >-
        An attribute that specifies the recommended network slicing related requirements (i.e. 
ServiceProfile and SliceProfile information) which can be supported by the MnS producer.
      type: string
    ResourceReservation:
      description: >-
        An attribute represents MnS consumer's requirements for resource reservation.
      type: boolean
    RequestedReservationExpiration:
      description: >-
        An attribute which specifes MnS consuner's requirements for the validity period of the 
resource reservation.
      type: string
    ResourceReservationStatus:
      description: >-
        An attribute which specifies the resource reservation result for the feasibility check job.
      type: string
      enum:
        - RESERVED
        - UNRESERVED
        - USED
    ReservationExpiration:
      description: >-
        An attribute which specifes the actual validity period of the resource reservation.
      type: string
    ReservationFailureReason:
      description: >-
        An attribute that specifies the additional reason information if the reservation is failed.
      type: string



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

    MnS:
      oneOf:
        - type: object
          properties:
            SubNetwork:
              $ref: '#/components/schemas/SubNetwork-Multiple'
#        - type: object
#          properties:
#            ManagedElement:
#              $ref: '#/components/schemas/ManagedElement-Multiple'

    SubNetwork-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              allOf:
                - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/SubNetwork-Attr'
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/SubNetwork-ncO'
        - type: object
          properties:
```

```
        SubNetwork:
          $ref: '#/components/schemas/SubNetwork-Multiple'
        NetworkSlice:
          $ref: '#/components/schemas/NetworkSlice-Multiple'
        NetworkSliceSubnet:
          $ref: '#/components/schemas/NetworkSliceSubnet-Multiple'
        EP_Transport:
          $ref: '#/components/schemas/EP_Transport-Multiple'
        NetworkSliceSubnetProviderCapabilities:
          $ref: '#/components/schemas/NetworkSliceSubnetProviderCapabilities-Multiple'
        FeasibilityCheckJob:
          $ref: '#/components/schemas/FeasibilityCheckAndReservationJob-Multiple'


NetworkSlice-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - type: object
              properties:
                networkSliceSubnetRef:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/Dn'
                operationalState:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/OperationalState'
                administrativeState:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/AdministrativeState'
                serviceProfileList:
                  $ref: '#/components/schemas/ServiceProfileList'

NetworkSliceSubnet-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          allOf:
            - type: object
              properties:
                managedFunctionRefList:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/DnList'
                networkSliceSubnetRefList:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/DnList'
                operationalState:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/OperationalState'
                administrativeState:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/AdministrativeState'
                nsInfo:
                  $ref: '#/components/schemas/NsInfo'
                sliceProfileList:
                  $ref: '#/components/schemas/SliceProfileList'
                epTransportRefList:
                  $ref: 'TS28623_ComDefs.yaml#/components/schemas/DnList'
                priorityLabel:
                  type: integer
                networkSliceSubnetType:
                  type: string
                  enum:
                    - TOP_SLICESUBNET
                    - RAN_SLICESUBNET
                    - CN_SLICESUBNET

EP_Transport-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          type: object
          properties:
            ipAddress:
              $ref: '#/components/schemas/IpAddress'
            logicalInterfaceInfo:
              $ref: '#/components/schemas/LogicalInterfaceInfo'
            nextHopInfo:
              type: string
```

```
            qosProfile:
              type: string
            epApplicationRefs:
              $ref: 'TS28623_ComDefs.yaml#/components/schemas/DnList'

    NetworkSliceSubnetProviderCapabilities-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              type: object
              properties:
                dLlatency:
                  type: integer
                uLlatency:
                  type: integer
                dLThptPerSliceSubnet:
                  $ref: '#/components/schemas/XLThpt'
                uLThptPerSliceSubnet:
                  $ref: '#/components/schemas/XLThpt'
                coverageAreaTAList:
                  $ref: 'TS28541_NrNrm.yaml#/components/schemas/NrTacList'
    FeasibilityCheckAndReservationJob-Single:
      allOf:
        - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
        - type: object
          properties:
            attributes:
              type: object
              properties:
                profile:
                  oneOf:
                    - $ref: '#/components/schemas/SliceProfile'
                    - $ref: '#/components/schemas/ServiceProfile'
                resourceReservation:
                  $ref: '#/components/schemas/ResourceReservation'
                recommendationRequest:
                  $ref: '#/components/schemas/RecommendationRequest'
                requestedReservationExpiration:
                  $ref: '#/components/schemas/RequestedReservationExpiration'
                processMonitor:
                  $ref: 'TS28623_GenericNrm.yaml#/components/schemas/ProcessMonitor'
                feasibilityResult:
                  $ref: '#/components/schemas/FeasibilityResult'
                inFeasibleReason:
                  $ref: '#/components/schemas/InFeasibleReason'
                resourceReservationStatus:
                  $ref: '#/components/schemas/ResourceReservationStatus'
                reservationFailureReason:
                  $ref: '#/components/schemas/ReservationFailureReason'
                reservationExpiration:
                  $ref: '#/components/schemas/ReservationExpiration'
                recommendedRequirements:
                  $ref: '#/components/schemas/RecommendedRequirements'

#-------- Definition of JSON arrays for name-contained IOCs ----------------------
    SubNetwork-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/SubNetwork-Single'

    NetworkSlice-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NetworkSlice-Single'

    NetworkSliceSubnet-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/NetworkSliceSubnet-Single'

    EP_Transport-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/EP_Transport-Single'

    NetworkSliceSubnetProviderCapabilities-Multiple:
```

```
      type: array
      items:
        $ref: '#/components/schemas/NetworkSliceSubnetProviderCapabilities-Single'
    FeasibilityCheckAndReservationJob-Multiple:
      type: array
      items:
        $ref: '#/components/schemas/FeasibilityCheckAndReservationJob-Single'

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

    resources-sliceNrm:
      oneOf:
       - $ref: '#/components/schemas/MnS'

       - $ref: '#/components/schemas/SubNetwork-Single'
       - $ref: '#/components/schemas/NetworkSlice-Single'
       - $ref: '#/components/schemas/NetworkSliceSubnet-Single'
       - $ref: '#/components/schemas/EP_Transport-Single'
       - $ref: '#/components/schemas/NetworkSliceSubnetProviderCapabilities-Single'
       - $ref: '#/components/schemas/FeasibilityCheckAndReservationJob-Single'
```

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 the `ServiceProfile` and `SliceProfile` captured in the network slice NRM fragment (see clause 6).

L.2 GSMA GST, ServiceProfile and sliceProfile

The GSMA GST is used as the SLA information for the communication between the NSC (e.g., vertical industry) and the NSP. 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 parameters [50] are used as input to `ServiceProfile.` The `ServiceProfile` which defines the service requirements related to a particular NSC, is translated into the `SliceProfile`. In particular, the attributes captured in the `ServiceProfile` are mapped to `TopSliceSubnetProfile` attributes. Based on the `TopSliceSubnetProfile` attributes, the corresponding requirements for the dedicated domain specific network slice subnets are defined. For example, the `CNSliceSubnetProfile` attributes are used to carry 5GC domain requirements, the `RANSliceSubnetProfile` attributes are used to carry NG-RAN domain requirements, and the TN requirements are derived and provide input to the TN domain.

As shown in Table L.2.1 some of the attributes in `CNSliceSubnetProfile` and `RANSliceSubnetProfile` parameters can be translated to configurable parameters related to network function behaviour to satisfy SLS of the service in the control plane. While other information (e.g., delay tolerance, deterministic communication support) in `CNSliceSubnetProfile` and `RANSliceSubnetProfile` are kept at OAM domain and is used to determine the overall behaviour of the network slice.

The following table show the translation of GST attributes.

Table L.2.1: GST translation

GST parameters	ServiceProfile attributes	SliceProfile Parameter			Configuration Parameters
		TopSlice SubnetProfile attributes	RANSlice SubnetProfile attributes	CNSlice SubnetProfile attributes	
Maximum number of UEs	maxNumberofUEs	maxNumberofUE	maxNumberofUEs	maxNumberofUEs	attributes in NSACF
Maximum number of PDU sessions	maxNumberofConns	maxNumberofPDUSessions	N/A	maxNumberofPDUSessions	TBD
Downlink maximum throughput per UE	dLThptPerUE	dLThptPerUE	dLThptPerUE	dLThptPerUE	TBD
Uplink maximum throughput per UE	uLThptPerUE	uLThptPerUE	uLThptPerUE	uLThptPerUE	TBD

Editor's note: The list of exact configurable parameters is to be revisited depending on the requirements from SA2 and RAN WGs.

NOTE: Void.

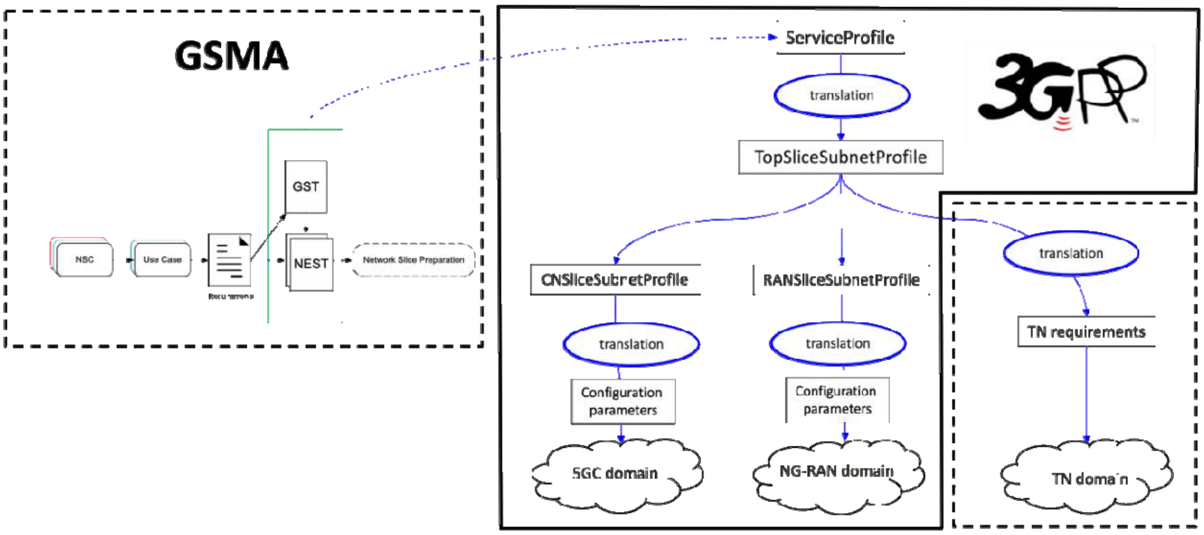

Figure L.2.1 Relation between GSMA GST, ServiceProfile and SliceProfile

Annex M (normative): Managed NF Service state handling

M.1 Combined state diagram for a Managed NF Service

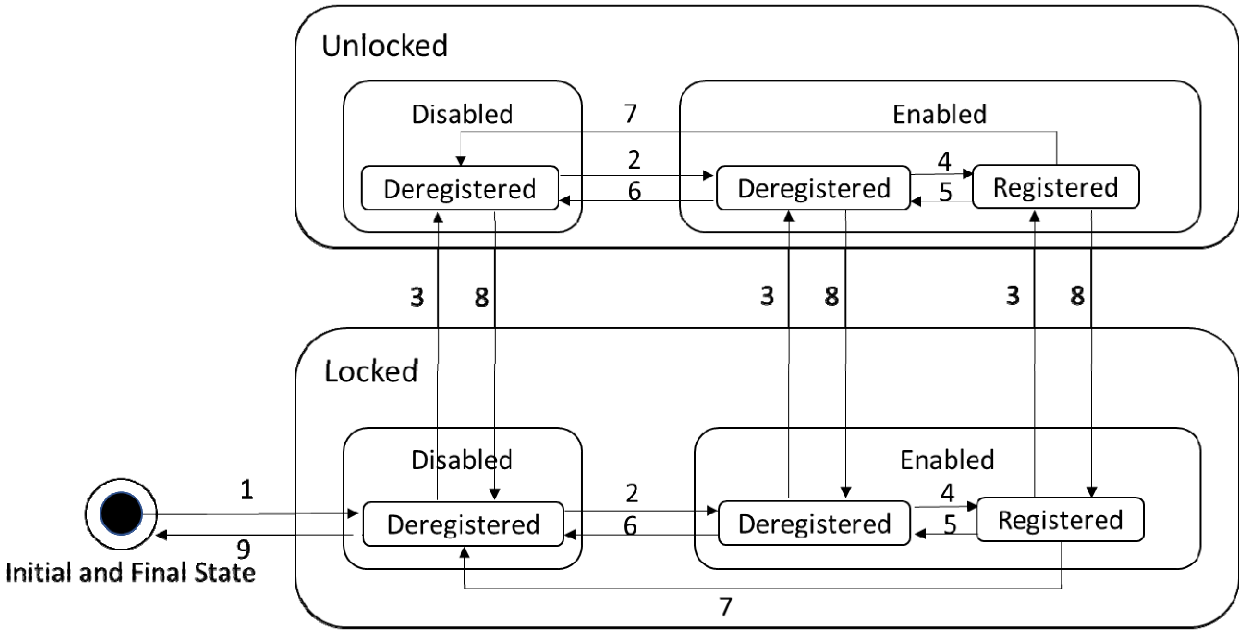

Figure M.1-1: Combined Managed NF Service state diagram

Table M.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 unavailable. 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 N (normative): YANG definition of the Slice NRM

N.1 General

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

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

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

N.2 Modules

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

```
<CODE BEGINS>
module _3gpp-ns-nrm-networkslice {
  yang-version 1.1;
  namespace urn:3gpp:sa5:_3gpp-ns-nrm-networkslice;
  prefix ns3gpp;

  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  include _3gpp-ns-nrm-serviceprofile;

  organization "3GPP SA5";
  contact
    "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "A network slice instance in a 5G network.";
  reference "3GPP TS 28.541
    Management and orchestration;
    5G Network Resource Model (NRM);
    Information model definitions for network slice NRM (chapter 6)
    ";

  revision 2022-07-26 { reference CR-0769; }
  revision 2020-06-02 {
    reference "CR-0485, CR-0508";
  }

  revision 2020-02-19 {
    description "Introduction of YANG definitions for network slice NRM";
    reference "CR-0458";
  }

  grouping NetworkSliceGrp {
    description "Represents the NetworkSlice IOC";
    leaf operationalState {
      description "The operational state of the network slice instance.
        It describes whether or not the resource is installed
        and working.";
      type types3gpp:OperationalState;
      config false;
      mandatory true;
    }

    leaf administrativeState {
      description "The administrative state of the network slice instance.
        It describes the permission to use or prohibition against
        using the instance, imposed through the OAM services.";
      type types3gpp:AdministrativeState;
      default LOCKED;
    }

    list serviceProfileList {
```

```
      description "A list of service profiles supported by the network
        slice instance.";
      key serviceProfileId;
      uses ServiceProfileGrp;
    }

    leaf networkSliceSubnetRef {
      type types3gpp:DistinguishedName;
      config false;
      mandatory true;
      description "DN of NetworkSliceSubnet relating to the
        NetworkSlice instance";
    }
  }

  augment /subnet3gpp:SubNetwork {
    list NetworkSlice {
      description "Represents the properties of a network slice instance in
        a 5G network.";
      key id;

      container attributes {
        uses NetworkSliceGrp;
      }

      uses top3gpp:Top_Grp;
    }
  }
}
<CODE ENDS>
```

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

```
<CODE BEGINS>
module _3gpp-ns-nrm-networkslicesubnet {
  yang-version 1.1;

  namespace urn:3gpp:sa5:_3gpp-ns-nrm-networkslicesubnet;
  prefix nss3gpp;

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-common-subnetwork { prefix subnet3gpp; }
  import _3gpp-common-top { prefix top3gpp; }

  include _3gpp-ns-nrm-sliceprofile;

  organization "3GPP SA5";
  contact
    "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "This IOC represents the properties of a network slice subnet
    instance in a 5G network.";
  reference "3GPP TS 28.541
    Management and orchestration;
    5G Network Resource Model (NRM);
    Information model definitions for network slice NRM (chapter 6)
    ";

  revision 2022-07-26 { reference CR-0769; }
  revision 2021-05-05 {
    description "replace perfReq with 3 new datatypes xxxSliceSubnetProfile";
    reference "CR-0485";
  }

  revision 2020-02-19 {
    description "Introduction of YANG definitions for network slice NRM";
    reference "CR-0458";
  }

  revision 2019-06-07 {
    description "initial revision";
    reference "Based on
      3GPP TS 28.541 V15.X.XX";
  }

  typedef ETSI-GS-NFV-Identifier {
    type string;
```

```
    reference "ETSI GS NFV-IFA 013";
  }

  grouping EPTransportGrp {
    leaf ipAddress {
      description "This parameter specifies the IP address assigned to a
        logical transport interface/endpoint. It can be an IPv4 address
        (See RFC 791) or an IPv6 address (See RFC 2373).";
      mandatory true;
      type string;
    }
    leaf logicInterfaceId {
      description "This parameter specifies the identify of a logical
        transport interface. It could be VLAN ID (See IEEE 802.1Q),
        MPLS Tag or Segment ID.";
      mandatory true;
      type string;
    }
    leaf-list nextHopInfo {
      description "This parameter is used to identify ingress transport
        node. Each node can be identified by any of combination of IP
        address of next-hop router of transport network, system name,
        port name, IP management address of transport nodes.";
      type string;
    }
    leaf-list qosProfile {
      description "This parameter specifies reference to QoS Profile for
      a logical transport interface. A QoS profile includes a set of
      parameters which are locally provisioned on both sides of a logical
      transport interface.";
      type string;
    }
    leaf-list epApplicationRef {
      description "This parameter specifies a list of application level
        EPs associated with the logical transport interface.";
      min-elements 1;
      type types3gpp:DistinguishedName;
    }
    uses top3gpp:Top_Grp;
  }

  grouping NsInfoGrp {
    description "The NsInfo of the NS instance corresponding to the network
      slice subnet instance.";
    //suport condition: It shall be supported if the NSS instance is
    //realized in the virtualized environment.
    // Otherwise this attribute shall be absent.
    reference "ETSI GS NFV-IFA 013 clause 8.3.3.2.2, which can be found at
      https://www.etsi.org/deliver/etsi_gs/NFV-IFA/001_099/013
      /03.04.01_60/gs_NFV-IFA013v030401p.pdf page 123-124";
    leaf nSInstanceId {
      description "Uniquely identifies the NS instance.";
      config false;
      type ETSI-GS-NFV-Identifier;
    }
    leaf nsName {
      description "Human readable name of the NS instance.";
      type string;
      config false;
    }
    leaf description {
      description "Human readable description of the NS instance.";
      config false;
      type string;
    }
  }

  grouping NetworkSliceSubnetGrp {
    description "Represents the NetworkSliceSubnet IOC.";

    leaf operationalState {
      description "The operational state of the resouce.
        It describes whether or not the resource is installed
        and working.";
      mandatory true;
      config false;
      type types3gpp:OperationalState;
    }
```

```
    leaf administrativeState {
      description "The administrative state of the network slice instance.
        It describes the permission to use or prohibition against
        using the instance, imposed through the OAM services.";
      mandatory true;
      type types3gpp:AdministrativeState;
      default LOCKED;
    }

    list nsInfo {
      description "This list represents the properties of network service
        information corresponding to the network slice subnet instance.";
      reference "ETSI GS NFV-IFA 013 clause 8.3.3.2.2";
      config false;
      key nSInstanceId;
      max-elements 1;
      uses NsInfoGrp;
    }

    list sliceProfileList {
      description "List of SliceProfiles supported by the network slice
        subnet instance. All members of the list, instances of SliceProfile,
        shall contain the same datatype representing slice profile requirements:
        TopSliceSubnetProfile, RANSliceSubnetProfile or CNSliceSubnetProfile.
        Members of the list may contain TopSliceSubnetProfile datatype
        only when this attribute (sliceProfileList) belongs to
        a NetworkSliceSubnet that is directly referenced by a NetworkSlice";
      key sliceProfileId;
      uses SliceProfileGrp;
    }

    leaf priorityLabel {
      type int32 ;
      mandatory true ;
      description "Specifies a label that consumer would assign a value on
        an instance of network slice subnet. The management system takes
        the value of this attribute into account. The effect of this
        attribute value to the subject managed entity is not standardized";
    }

    leaf networkSliceSubnetType {
      type enumeration {
        enum TOP_SLICESUBNET;
        enum RAN_SLICESUBNET;
        enum CN_SLICESUBNET;
      }
      mandatory true;
      description "Indicates the type of network slice subnet, including:
        - Top network slice subnet
        - RAN network slice subnet
        - CN network slice subnet";
    }

    leaf-list managedFunctionRef {
      type types3gpp:DistinguishedName;
      config false;
      description "This holds a list of DN of ManagedFunction instances
        supporting the NetworkSliceSubnet instance.";
    }

    leaf-list networkSliceSubnetRef {
      type types3gpp:DistinguishedName;
      config false;
      description "List of DNs of constituent NetworkSliceSubnet supporting
        NetworkSliceSubnet instance .";
    }

    leaf-list epTransportRef {
      type types3gpp:DistinguishedName;
      description "List of transport level EPs associated with the
        application level EP (i.e. EP_N3 or EP_NgU) or network slice subnet.";
    }  }

  augment /subnet3gpp:SubNetwork {
    list NetworkSliceSubnet {
      description "Represents the properties of a network slice subnet
        instance in a 5G network .
```

```
        The NetworkSliceSubnet can be categorized by following types:
        - RANSliceSubne represent the RAN network slice subnet in a 5G network,
        which is associated to one or multiple 'RANSliceSubnetProfile'.
        - CNSliceSubnet represent the CN network slice subnet in a 5G network,
        which is associated to one or multiple 'CNSliceSubnetProfile'.
        - TopSliceSubnet represent the top network slice subnet in a 5G network,
        which is associated to one or multiple 'TopSliceSubnetProfile'.

        The attribute epTransportRef is used to specify a list of EP_Transport
        instance as transport resources to be aggregated to a NetworkSliceSubnet
        instance. The MnS consumer determines the EP_Transport instance(s) to
        support EP_Application instances as part of the NetworkSliceSubnet
        instance and request the MnS producer to configure the attribute
        epTransportRef of the NetworkSliceSubnet.

        The EP_Transport is name contained by SubNetwork, and an EP_Transport
        instance can be a new instance created for the EP_Application instances
        as part of NetworkSliceSubnet instance or an existing instance reused
        for EP_Application instance.";
      key id;

      container attributes {
        uses NetworkSliceSubnetGrp;
    }

    uses top3gpp:Top_Grp;
  }
}
<CODE ENDS>
```

N.2.3 Void

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

```
<CODE BEGINS>
submodule _3gpp-ns-nrm-serviceprofile {
  yang-version 1.1;
  belongs-to _3gpp-ns-nrm-networkslice { prefix ns3gpp; }

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  import _3gpp-ns-nrm-common { prefix ns3cmn; }

  organization "3GPP SA5";
  contact
    "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "A network slice instance in a 5G network.";
  reference "3GPP TS 28.541
    Management and orchestration;
    5G Network Resource Model (NRM);
    Information model definitions for network slice NRM (chapter 6)
    ";

  revision 2020-06-02 {
    reference "CR-0485, CR-0508";
  }

  revision 2020-02-19 {
    description "Introduction of YANG definitions for network slice NRM";
    reference "CR-0458";
  }

  revision 2019-06-23 {
    description "Initial revision";
    reference "3GPP TS 28.541 V15.X.XX";
  }

  typedef availability-percentage {
    description "
      Percentage value of the amount of time the end-to-end communication
      service is delivered according to an agreed QoS, divided by the amount
      of time the system is expected to deliver the end-to-end service
```

```
      according to the specification in a specific area.";
    reference "3GPP TS 22.261 3.1";
    type decimal64 {
      fraction-digits 4; // E.g. 99.9999
      range 0..100;
    }
  }

  typedef V2XMode-enum {
    type enumeration {
      enum NOT_SUPPORTED;
      enum SUPPORTED_BY_NR;
    }
  }

  grouping ServiceProfileGrp {

    leaf serviceProfileId {
      description "Service profile identifier.";
      type types3gpp:DistinguishedName;
    }

    list sNSSAIList {
      description "The S-NSSAI list to be supported by the new NSI to be
        created or the existing NSI to be re-used.";
      min-elements 1;
      key idx;
      unique "sst sd";
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses types5g3gpp:SNssai;
    }

    list pLMNIdList {
      description "List of PLMN IDs.";
      min-elements 1;
      key "mcc mnc";
      ordered-by user;
      uses types3gpp:PLMNId;
    }

    leaf maxNumberofUEs {
      description "The maximum number of UEs that may simultaneously
        access the network slice instance.";
      mandatory true;
      type uint64;
    }

    leaf-list coverageArea {
       min-elements 1;
       description "A list of TrackingAreas where the NSI can be selected.";
       type types3gpp:Tac;
    }

    leaf latency {
      description "The packet transmission latency (milliseconds) through
        the RAN, CN, and TN part of 5G network, used to evaluate utilization
        performance of the end-to-end network slice instance.";
      reference "3GPP TS 28.554 clause 6.3.1";
      mandatory true;
      type uint16;
      units milliseconds;
    }

    leaf uEMobilityLevel {
      description "The mobility level of UE accessing the network slice
        instance.";
      reference "3GPP TS 22.261 clause 6.2.1";
      type types3gpp:UeMobilityLevel;
    }

    leaf resourceSharingLevel {
      description "Specifies whether the resources to be allocated to the
        network slice instance may be shared with another network slice
        instance(s).";
      type types3gpp:ResourceSharingLevel;
```

```
    }

    //Stage2 issue: The sNSSAIList above specifies one or potentially
    //              several sST objects for the service profile.
    //              How do they relate?
    leaf sST {
      description "Specifies the slice/service type. See 3GPP TS 23.501
        for defined values.";
      mandatory true;
      type uint32;
      reference "3GPP TS 23.501 5.15.2.2";
    }

    leaf availability {
      description "The availability requirement for a network slice
        instance, expressed as a percentage.";
      type availability-percentage;
    }

    list delayTolerance {
      description "An attribute specifies the properties of service delivery
        flexibility, especially for the vertical services that are not
        chasing a high system performance.";
      reference "TS 22.104 clause 4.3";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn:ServAttrComGrp;
      }
      leaf support {
        description "An attribute specifies whether or not the network
          slice supports service delivery flexibility, especially for the
          vertical services that are not chasing a high system performance.";
        type ns3cmn:Support-enum;
      }
    }
    list deterministicComm {
      //Stage2 issue: deterministicComm is not defined in 28.541 chapter 6,
      //              but I guess deterministicComm is meant
      description "This list represents the properties of the deterministic
        communication for periodic user traffic. Periodic traffic refers to the
        type of traffic with periodic transmissions.";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        config false;
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn:ServAttrComGrp;
      }
      leaf availability {
```

```
        //Stage2 issue: Defined differently in 28.541 chapter 6, but XML
        //              uses DeterministicCommAvailability
        config false;
        type ns3cmn:DeterminCommAvailability;
      }
      leaf periodicityList {
        //Stage2 issue: Not defined in 28.541 chapter 6. XML and YAML
        //              says "string".
        type string;
      }
    }
    list dLThptPerSlice {
      description "This attribute defines achievable data rate of the
        network slice in downlink that is available ubiquitously across
        the coverage area of the slice";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn:XLThptGrp;
    }
    list dLThptPerUE {
      description "This attribute defines data rate supported by the network
        slice per UE";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn:XLThptGrp;
    }
    list uLThptPerSlice {
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      description "This attribute defines achievable data rate of the
        network slice in uplink that is available ubiquitously across
        the coverage area of the slice";
      uses ns3cmn:XLThptGrp;
    }
    list uLThptPerUE {
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      description "This attribute defines data rate supported by the
        network slice per UE";
      uses ns3cmn:XLThptGrp;
    }
    list maxPktSize {
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      description "This parameter specifies the maximum packet size
        supported by the network slice";
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
```

```
        uses ns3cmn:ServAttrComGrp;
      }
      leaf maxSize {
        //Stage2 issue: Not defined in 28.541, guessing integer bytes
        type uint32;
        units bytes;
      }
    }
    list maxNumberofPDUSessions {
      description "Represents the maximum number of
        concurrent PDU sessions supported by the network slice";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn:ServAttrComGrp;
      }
      leaf nOofPDUSessions {
        //Stage2 issue: Not defined in 28.541, guessing integer
        type uint32;
      }
    }
    list kPIMonitoring {
      description "Represents performance monitoring";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn:ServAttrComGrp;
      }
      leaf kPIList {
        //Stage2 issue: Data format not specified, low interoperability
        description "An attribute specifies the name list of KQIs and KPIs
        available for performance monitoring";
        type string;
      }
    }
    list userMgmtOpen {
      description "An attribute specifies whether or not the network slice
        supports the capability for the NSC to manage their users or groups
        of users' network services and corresponding requirements.";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
```

```
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn:ServAttrComGrp;
      }
      leaf support {
        type ns3cmn:Support-enum;
      }
    }
    list v2XCommModels {
      description "An attribute specifies whether or not the V2X
        communication mode is supported by the network slice.";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
        tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn:ServAttrComGrp;
      }
      leaf v2XMode {
        type V2XMode-enum;
      }
    }
    list termDensity {
      description "An attribute specifies the overall user density over
        the coverage area of the network slice";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn:ServAttrComGrp;
      }
      leaf density {
        type uint32;
        units users/km2;
      }
    }
    leaf activityFactor {
      //Stage2 issue: This is modeled as writable/config true in 28.542,
      //              but that does not appear to match the description
      description "An attribute specifies the percentage value of the
        amount of simultaneous active UEs to the total number of UEs where
        active means the UEs are exchanging data with the network";
      reference "TS 22.261 Table 7.1-1";
      type decimal64 {
```

```
        fraction-digits 1;
      }
    }
    leaf uESpeed {
      //Stage2 issue: This is modeled as writable/config true in 28.542,
      //              but that does not appear to match the description
      description "An attribute specifies the maximum speed (in km/hour)
        supported by the network slice at which a defined QoS can be
        achieved";
      type uint32;
      units km/h;
    }
    leaf jitter {
      //Stage2 issue: This is modeled as writable/config true in 28.542,
      //              but that does not appear to match the description
      description "An attribute specifies the deviation from the desired
        value to the actual value when assessing time parameters";
      reference "TS 22.104 clause C.4.1";
      type uint32;
      units microseconds;
    }
    leaf survivalTime {
      description "An attribute specifies the time that an application
        consuming a communication service may continue without an
        anticipated message.";
      reference "TS 22.104 clause 5";
      type string;
    }
    leaf reliability {
      description "An attribute specifies in the context of network layer
        packet transmissions, percentage value of the amount of sent
        network layer packets successfully delivered to a given system
        entity within the time constraint required by the targeted service,
        divided by the total number of sent network layer packets.";
      reference "TS 22.261, TS 22.104";
      type string;
    }
    leaf maxDLDataVolume {
      //Stage2 issue: Not defined in 28.541. XML and YAML says "string"
      type string;
    }
    leaf maxULDataVolume {
      //Stage2 issue: Not defined in 28.541. XML and YAML says "string"
      type string;
    }
    list nBIoT {
      description "An attribute specifies whether NB-IoT is supported in
        the RAN in the network slice";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn:ServAttrComGrp;
      }
      leaf support {
        description "An attribute specifies whether NB-IoT is supported
          in the RAN in the network slice";
        type ns3cmn:Support-enum;
      }
    }
  }
}
<CODE ENDS>
```

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

```
<CODE BEGINS>
submodule _3gpp-ns-nrm-sliceprofile {
  yang-version 1.1;
  belongs-to _3gpp-ns-nrm-networkslicesubnet { prefix nss3gpp; }

  import _3gpp-common-yang-types { prefix types3gpp; }
  import _3gpp-5g-common-yang-types { prefix types5g3gpp; }
  // import _3gpp-ns-nrm-networkslice { prefix ns3gpp; }
  import _3gpp-ns-nrm-common { prefix ns3cmn3gpp; }

  organization "3GPP SA5";
  contact
    "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Represents the properties of network slice subnet related
    requirement that should be supported by the network slice subnet
    instance in a 5G network.";
  reference "3GPP TS 28.541
    Management and orchestration;
    5G Network Resource Model (NRM);
    Information model definitions for network slice NRM (chapter 6)
    ";

  revision 2021-07-16 { reference CR-0566 ; }
  revision 2021-05-05 {
    description "replace perfReq with 3 new datatypes xxxSliceSubnetProfile";
    reference "CR-0485";
  }

  revision 2020-02-19 {
    description "Introduction of YANG definitions for network slice NRM";
    reference "CR-0458";
  }

  revision 2019-05-27 {
    description "initial revision.";
    reference "Based on
      3GPP TS 28.541 V15.X.XX";
  }
  typedef SliceSimultaneousUse-enum {
    type enumeration {
      enum ZERO;
      enum ONE;
      enum TWO;
      enum THREE;
      enum FOUR;
    }
  }
  typedef ServiceType-enum {
    type enumeration {
      enum eMBB;
      enum URLLC;
      enum MIoT;
      enum V2X;
    }
  }

  grouping PositioningGrp {
    description "Represents positioning support.";
    reference "Clause 3.4.20 of GSMA NG.116 ";

    uses ns3cmn3gpp:ServAttrComGrp ;
    leaf-list availability {
      type enumeration {
        enum CIDE_CID ;
        enum OTDOA;
        enum RF_FINGERPRINTING;
        enum AECID;
        enum HYBRID_POSITIONING;
        enum NET_RTK;
      }
      min-elements 1;
      config false;
      description "Specifies if this attribute is provided by the RAN domain
        of the network slice and contains a list of positioning methods
        provided by the RAN domain. If the list is empty this attribute is
```

```
        not available in the RAN domain and the other parameters might be
        ignored, see NG.116. Values allowed: are
        CIDE-CID (LTE and NR), OTDOA (LTE and NR), RF fingerprinting, AECID,
        Hybrid positioning, NET-RTK.";
    }
    leaf predictionfrequency {
      type enumeration {
        enum PERSEC;
        enum PERMIN;
        enum PERHOUR;
      }
      mandatory true;
      description "Specifies how often location information is provided.
        This parameter simply defines how often the customer is allowed to
        request location information. This is not related to the time it
        takes to determine the location, which is a characteristic of the
        positioning method.
        If leaf-list availability is empty, the value has no meaning.";
        reference "NG.116";
    }
    leaf accuracy {
      type decimal64 {
         fraction-digits 2;
      }
      units meter;
      mandatory true;
      description "Specifies the accuracy of the location information.
        Accuracy depends on the respective positioning solution applied in the
        RAN domain of the network slice.";
      reference "NG.116";
    }
  }

  grouping TopSliceSubnetProfileGrp {
    leaf-list coverageArea {
       min-elements 1;
       description "A list of TrackingAreas where the NSI can be selected.";
       type types3gpp:Tac;
    }
    leaf latency {
      description "The packet transmission latency (milliseconds) through
        the RAN, CN, and TN part of 5G network, used to evaluate
        utilization performance of the end-to-end network slice instance.";
      reference "3GPP TS 28.554 clause 6.3.1";
      //optional support
      mandatory true;
      type uint16;
      units milliseconds;
    }
    leaf maxNumberofUEs {
      description "Specifies the maximum number of UEs may simultaneously
        access the network slice instance.";
      //optional support
      mandatory true;
      type uint64;
    }
    list dLThptPerSliceSubnet {
      description "This attribute defines achievable data rate of the
        network slice subnet in downlink that is available ubiquitously
        across the coverage area of the slice";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn3gpp:XLThptGrp;
    }
    list dLThptPerUE {
      description "This attribute defines data rate supported by the
        network slice per UE, refer NG.116.";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn3gpp:XLThptGrp;
```

```
    }
    list uLThptPerSliceSubnet {
      description "This attribute defines achievable data rate of the
        network slice subnet in uplink that is available ubiquitously
        across the coverage area of the slice";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn3gpp:XLThptGrp;
    }
    list uLThptPerUE {
      description "This attribute defines data rate supported by the
        network slice per UE, refer NG.116";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn3gpp:XLThptGrp;
    }
    list maxPktSize {
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      description "This parameter specifies the maximum packet size
        supported by the network slice";
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn3gpp:ServAttrComGrp;
      }
      leaf maxSize {
        //Stage2 issue: Not defined in 28.541, guessing integer bytes
        type uint32;
        units bytes;
      }
    }
    list maxNumberofPDUSessions {
      description "Represents the maximum number of
        concurrent PDU sessions supported by the network slice";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn3gpp:ServAttrComGrp;
      }
      leaf nOofPDUSessions {
        //Stage2 issue: Not defined in 28.541, guessing integer
```

```
        type uint32;
      }
    }
    leaf sliceSimultaneousUse {
      description "This attribute describes whether a network slice
      can be simultaneously used by a device together with other
      network slices and if so, with which other classes of network slices.";
      type SliceSimultaneousUse-enum;
    }
    list delayTolerance {
      description "An attribute specifies the properties of service delivery
        flexibility, especially for the vertical services that are not
        chasing a high system performance.";
      reference "TS 22.104 clause 4.3";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn3gpp:ServAttrComGrp;
      }
      leaf support {
        description "An attribute specifies whether or not the network
          slice supports service delivery flexibility, especially for the
          vertical services that are not chasing a high system performance.";
        type ns3cmn3gpp:Support-enum;
      }
    }
    list termDensity {
      description "An attribute specifies the overall user density over
        the coverage area of the network slice";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn3gpp:ServAttrComGrp;
      }
      leaf density {
        type uint32;
        units users/km2;
      }
    }
    leaf activityFactor {
      //Stage2 issue: This is modeled as writable/config true in 28.542,
      //              but that does not appear to match the description
      description "An attribute specifies the percentage value of the
        amount of simultaneous active UEs to the total number of UEs where
        active means the UEs are exchanging data with the network";
      reference "TS 22.261 Table 7.1-1";
      type decimal64 {
        fraction-digits 1;
```

```
      }
    }
    leaf-list coverageAreaTAList {
      description "A list of TrackingAreas where the NSI can be selected.";
      //optional support
      min-elements 1;
      type types3gpp:Tac;
    }
    leaf uEMobilityLevel {
      description "The mobility level of UE accessing the network slice
        instance.";
      //optional support
      type types3gpp:UeMobilityLevel;
    }

    leaf resourceSharingLevel {
      description "Specifies whether the resources to be allocated to the
        network slice subnet instance may be shared with another network
        slice subnet instance(s).";
      //optional support
      type types3gpp:ResourceSharingLevel;
    }
    leaf uESpeed {
      //Stage2 issue: This is modeled as writable/config true in 28.542,
      //              but that does not appear to match the description
      description "An attribute specifies the maximum speed (in km/hour)
        supported by the network slice at which a defined QoS can be
        achieved";
      type uint32;
      units km/h;
    }
    leaf reliability {
      description "An attribute specifies in the context of network layer
        packet transmissions, percentage value of the amount of sent
        network layer packets successfully delivered to a given system
        entity within the time constraint required by the targeted service,
        divided by the total number of sent network layer packets.";
      reference "TS 22.261, TS 22.104";
      type string;
    }
    leaf serviceType {
      description "An attribute specifies the standardized network slice type.
      allowedValues: eMBB, URLLC, MIoT, V2X.";
      type ServiceType-enum;
    }
    list deterministicComm {
      //Stage2 issue: deterministicComm is not defined in 28.541 chapter 6,
      //              but I guess determinComm is meant
      description "This list represents the properties of the deterministic
        communication for periodic user traffic. Periodic traffic refers to the
        type of traffic with periodic transmissions.";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        config false;
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn3gpp:ServAttrComGrp;
      }
      leaf availability {
        //Stage2 issue: Defined differently in 28.541 chapter 6, but XML
        //              uses DeterminCommAvailability
        config false;
        type ns3cmn3gpp:DeterminCommAvailability;
      }
      leaf periodicityList {
```

```
        //Stage2 issue: Not defined in 28.541 chapter 6. XML and YAML
        //              says "string".
        type string;
      }
    }
    leaf survivalTime {
      description "An attribute specifies the time that an application
        consuming a communication service may continue without an
        anticipated message.";
      reference "TS 22.104 clause 5";
      type string;
    }
    list positioning {
      key predictionfrequency;
      min-elements 1;
      max-elements 1;
      description "Specifies whether the network slice provides
        geo-localization methods or supporting methods";
      reference "Clause 3.4.20 of NG.116";
      uses PositioningGrp;
    }
  }

  grouping CNSliceSubnetProfileGrp {
    leaf-list coverageArea {
       min-elements 1;
       description "A list of TrackingAreas where the NSI can be selected.";
       type types3gpp:Tac;
    }
    leaf latency {
      description "The packet transmission latency (milliseconds) through
        the RAN, CN, and TN part of 5G network, used to evaluate
        utilization performance of the end-to-end network slice instance.";
      reference "3GPP TS 28.554 clause 6.3.1";
      //optional support
      mandatory true;
      type uint16;
      units milliseconds;
    }
    leaf maxNumberofUEs {
      description "Specifies the maximum number of UEs may simultaneously
        access the network slice instance.";
      //optional support
      mandatory true;
      type uint64;
    }
    list dLThptPerSliceSubnet {
      description "This attribute defines achievable data rate of the
        network slice subnet in downlink that is available ubiquitously
        across the coverage area of the slice";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn3gpp:XLThptGrp;
    }
    list dLThptPerUE {
      description "This attribute defines data rate supported by the
        network slice per UE, refer NG.116.";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn3gpp:XLThptGrp;
    }
    list uLThptPerSliceSubnet {
      description "This attribute defines achievable data rate of the
        network slice subnet in uplink that is available ubiquitously
        across the coverage area of the slice";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
```

```
      }
      uses ns3cmn3gpp:XLThptGrp;
    }
    list uLThptPerUE {
      description "This attribute defines data rate supported by the
        network slice per UE, refer NG.116";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn3gpp:XLThptGrp;
    }
    list maxPktSize {
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      description "This parameter specifies the maximum packet size
        supported by the network slice";
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn3gpp:ServAttrComGrp;
      }
      leaf maxSize {
        //Stage2 issue: Not defined in 28.541, guessing integer bytes
        type uint32;
        units bytes;
      }
    }
    list maxNumberofPDUSessions {
      description "Represents the maximum number of
        concurrent PDU sessions supported by the network slice";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn3gpp:ServAttrComGrp;
      }
      leaf nOofPDUSessions {
        //Stage2 issue: Not defined in 28.541, guessing integer
        type uint32;
      }
    }
    leaf sliceSimultaneousUse {
      description "This attribute describes whether a network slice
      can be simultaneously used by a device together with other
      network slices and if so, with which other classes of network slices.";
      type SliceSimultaneousUse-enum;
    }
    list delayTolerance {
```

```
      description "An attribute specifies the properties of service delivery
        flexibility, especially for the vertical services that are not
        chasing a high system performance.";
      reference "TS 22.104 clause 4.3";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn3gpp:ServAttrComGrp;
      }
      leaf support {
        description "An attribute specifies whether or not the network
          slice supports service delivery flexibility, especially for the
          vertical services that are not chasing a high system performance.";
        type ns3cmn3gpp:Support-enum;
      }
    }
    leaf-list coverageAreaTAList {
      description "A list of TrackingAreas where the NSI can be selected.";
      //optional support
      min-elements 1;
      type types3gpp:Tac;
    }
    leaf resourceSharingLevel {
      description "Specifies whether the resources to be allocated to the
        network slice subnet instance may be shared with another network
        slice subnet instance(s).";
      //optional support
      type types3gpp:ResourceSharingLevel;
    }

    list deterministicComm {
      //Stage2 issue: deterministicComm is not defined in 28.541 chapter 6,
      //              but I guess determinComm is meant
      description "This list represents the properties of the deterministic
        communication for periodic user traffic. Periodic traffic refers to the
        type of traffic with periodic transmissions.";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        config false;
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn3gpp:ServAttrComGrp;
      }
      leaf availability {
        //Stage2 issue: Defined differently in 28.541 chapter 6, but XML
        //              uses DeterminCommAvailability
        config false;
        type ns3cmn3gpp:DeterminCommAvailability;
      }
      leaf periodicityList {
```

```
        //Stage2 issue: Not defined in 28.541 chapter 6. XML and YAML
        //              says "string".
        type string;
      }
    }
  }

  grouping PositioningRANSubnetGrp {
    description "Represents positioning support in RAN domain";
    leaf-list availability {
      type enumeration {
        enum CIDE_CID ;
        enum OTDOA;
        enum RF_FINGERPRINTING;
        enum AECID;
        enum HYBRID_POSITIONING;
        enum NET_RTK;
      }
      config false;
      description "Specifies if this attribute is provided by the RAN domain
        of the network slice and contains a list of positioning methods
        provided by the RAN domain. If the list is empty this attribute is
        not available in the RAN domain and the other parameters might be
        ignored, see NG.116. Values allowed: are
        CIDE-CID (LTE and NR), OTDOA (LTE and NR), RF fingerprinting, AECID,
        Hybrid positioning, NET-RTK.";
    }
    leaf predictionfrequency {
      type enumeration {
        enum PERSEC;
        enum PERMIN;
        enum PERHOUR;
      }
      mandatory true;
      description "Specifies how often location information is provided.
        This parameter simply defines how often the customer is allowed to
        request location information. This is not related to the time it
        takes to determine the location, which is a characteristic of the
        positioning method.
        If leaf-list availability is empty, the value has no meaning.";
        reference "NG.116";
    }
    leaf accuracy {
      type decimal64 {
         fraction-digits 2;
      }
      units meter;
      mandatory true;
      description "Specifies the accuracy of the location information.
        Accuracy depends on the respective positioning solution applied in the
        RAN domain of the network slice.";
      reference "NG.116";
    }
  }

  grouping RANSliceSubnetProfileGrp {
    description "Represents the RANSliceSubnetProfile datatype";
    leaf latency {
      description "The packet transmission latency (milliseconds) through
        the RAN, CN, and TN part of 5G network, used to evaluate
        utilization performance of the end-to-end network slice instance.";
      reference "3GPP TS 28.554 clause 6.3.1";
      //optional support
      mandatory true;
      type uint16;
      units milliseconds;
    }
    leaf maxNumberofUEs {
      description "Specifies the maximum number of UEs may simultaneously
        access the network slice instance.";
      //optional support
      mandatory true;
      type uint64;
    }
    list dLThptPerSliceSubnet {
      description "This attribute defines achievable data rate of the
        network slice subnet in downlink that is available ubiquitously
        across the coverage area of the slice";
```

```
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn3gpp:XLThptGrp;
    }
    list dLThptPerUE {
      description "This attribute defines data rate supported by the
        network slice per UE, refer NG.116.";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn3gpp:XLThptGrp;
    }
    list uLThptPerSliceSubnet {
      description "This attribute defines achievable data rate of the
        network slice subnet in uplink that is available ubiquitously
        across the coverage area of the slice";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn3gpp:XLThptGrp;
    }
    list uLThptPerUE {
      description "This attribute defines data rate supported by the
        network slice per UE, refer NG.116";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn3gpp:XLThptGrp;
    }
    list maxPktSize {
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      description "This parameter specifies the maximum packet size
        supported by the network slice";
      list servAttrCom {
        description "This list represents the common properties of service
          requirement related attributes.";
        reference "GSMA NG.116 corresponding to Attribute categories,
          tagging and exposure";
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        uses ns3cmn3gpp:ServAttrComGrp;
      }
      leaf maxSize {
        //Stage2 issue: Not defined in 28.541, guessing integer bytes
        type uint32;
        units bytes;
      }
    }
    list delayTolerance {
      description "An attribute specifies the properties of service delivery
        flexibility, especially for the vertical services that are not
        chasing a high system performance.";
      reference "TS 22.104 clause 4.3";
      config false;
      key idx;
```

```
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        list servAttrCom {
          description "This list represents the common properties of service
            requirement related attributes.";
          reference "GSMA NG.116 corresponding to Attribute categories,
            tagging and exposure";
          key idx;
          max-elements 1;
          leaf idx {
            description "Synthetic index for the element.";
            type uint32;
          }
          uses ns3cmn3gpp:ServAttrComGrp;
        }
        leaf support {
          description "An attribute specifies whether or not the network
            slice supports service delivery flexibility, especially for the
            vertical services that are not chasing a high system performance.";
          type ns3cmn3gpp:Support-enum;
        }
      }
      leaf sliceSimultaneousUse {
        description "This attribute describes whether a network slice
        can be simultaneously used by a device together with other
        network slices and if so, with which other classes of network slices.";
        type SliceSimultaneousUse-enum;
      }
      list termDensity {
        description "An attribute specifies the overall user density over
          the coverage area of the network slice";
        config false;
        key idx;
        max-elements 1;
        leaf idx {
          description "Synthetic index for the element.";
          type uint32;
        }
        list servAttrCom {
          description "This list represents the common properties of service
            requirement related attributes.";
          reference "GSMA NG.116 corresponding to Attribute categories,
            tagging and exposure";
          key idx;
          max-elements 1;
          leaf idx {
            description "Synthetic index for the element.";
            type uint32;
          }
          uses ns3cmn3gpp:ServAttrComGrp;
        }
        leaf density {
          type uint32;
          units users/km2;
        }
      }
      leaf activityFactor {
        //Stage2 issue: This is modeled as writable/config true in 28.542,
        //              but that does not appear to match the description
        description "An attribute specifies the percentage value of the
          amount of simultaneous active UEs to the total number of UEs where
          active means the UEs are exchanging data with the network";
        reference "TS 22.261 Table 7.1-1";
        type decimal64 {
          fraction-digits 1;
        }
      }
      leaf-list coverageAreaTAList {
        description "A list of TrackingAreas where the NSI can be selected.";
        //optional support
        min-elements 1;
        type types3gpp:Tac;
      }
      leaf uEMobilityLevel {
        description "The mobility level of UE accessing the network slice
```

```
      instance.";
    //optional support
    type types3gpp:UeMobilityLevel;
  }

  leaf resourceSharingLevel {
    description "Specifies whether the resources to be allocated to the
      network slice subnet instance may be shared with another network
      slice subnet instance(s).";
    //optional support
    type types3gpp:ResourceSharingLevel;
  }
  leaf uESpeed {
    //Stage2 issue: This is modeled as writable/config true in 28.542,
    //              but that does not appear to match the description
    description "An attribute specifies the maximum speed (in km/hour)
      supported by the network slice at which a defined QoS can be
      achieved";
    type uint32;
    units km/h;
  }
  leaf reliability {
    description "An attribute specifies in the context of network layer
      packet transmissions, percentage value of the amount of sent
      network layer packets successfully delivered to a given system
      entity within the time constraint required by the targeted service,
      divided by the total number of sent network layer packets.";
    reference "TS 22.261, TS 22.104";
    type string;
  }
  leaf serviceType {
    description "An attribute specifies the standardized network slice type.
    allowedValues: eMBB, URLLC, MIoT, V2X.";
    type ServiceType-enum;
  }
  list deterministicComm {
    //Stage2 issue: deterministicComm is not defined in 28.541 chapter 6,
    //              but I guess determinComm is meant
    description "This list represents the properties of the deterministic
      communication for periodic user traffic. Periodic traffic refers to the
      type of traffic with periodic transmissions.";
    key idx;
    max-elements 1;
    leaf idx {
      description "Synthetic index for the element.";
      type uint32;
    }
    list servAttrCom {
      description "This list represents the common properties of service
        requirement related attributes.";
      reference "GSMA NG.116 corresponding to Attribute categories,
        tagging and exposure";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ns3cmn3gpp:ServAttrComGrp;
    }
    leaf availability {
      //Stage2 issue: Defined differently in 28.541 chapter 6, but XML
      //              uses DeterminCommAvailability
      config false;
      type ns3cmn3gpp:DeterminCommAvailability;
    }
    leaf periodicityList {
      //Stage2 issue: Not defined in 28.541 chapter 6. XML and YAML
      //              says "string".
      type string;
    }
  }
  leaf survivalTime {
    description "An attribute specifies the time that an application
      consuming a communication service may continue without an
      anticipated message.";
    reference "TS 22.104 clause 5";
```

```
      type string;
    }
    list positioning {
      min-elements 1;
      max-elements 1;
      description "Specifies whether the RAN domain of the network slice
        provides geo-localization methods or supporting methods.";
      reference "Clause 3.4.20 of NG.116 [50].";
      uses PositioningRANSubnetGrp;
    }
  }

  grouping SliceProfileGrp {
    leaf sliceProfileId {
      description "A unique identifier of the property of network slice
        subnet related requirement should be supported by the network
        slice subnet instance.";
      type types3gpp:DistinguishedName;
    }

    list sNSSAIList {
      description "List of S-NSSAIs the managed object is capable of
        supporting. (Single Network Slice Selection Assistance Information)
        An S-NSSAI has an SST (Slice/Service type) and an optional SD
        (Slice Differentiator) field.";
      key idx;
      unique "sst sd";
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses types5g3gpp:SNssai;
    }

    list pLMNIdList {
      description "List of at most six entries of PLMN Identifiers, but at
        least one (the primary PLMN Id).  The PLMN Identifier is composed
        of a Mobile Country Code (MCC) and a Mobile Network Code (MNC).";
      min-elements 1;
      max-elements 6;
      key "mcc mnc";
      ordered-by user;
      uses types3gpp:PLMNId;
    }

    leaf maxNumberofUEs {
      description "Specifies the maximum number of UEs may simultaneously
        access the network slice instance.";
      //optional support
      mandatory true;
      type uint64;
    }

    leaf-list coverageAreaTAList {
      description "A list of TrackingAreas where the NSI can be selected.";
      //optional support
      min-elements 1;
      type types3gpp:Tac;
    }

    leaf latency {
      description "The packet transmission latency (milliseconds) through
        the RAN, CN, and TN part of 5G network, used to evaluate
        utilization performance of the end-to-end network slice instance.";
      reference "3GPP TS 28.554 clause 6.3.1";
      //optional support
      mandatory true;
      type uint16;
      units milliseconds;
    }

    leaf uEMobilityLevel {
      description "The mobility level of UE accessing the network slice
        instance.";
      //optional support
      type types3gpp:UeMobilityLevel;
    }
```

```
    leaf resourceSharingLevel {
      description "Specifies whether the resources to be allocated to the
        network slice subnet  instance may be shared with another network
        slice subnet instance(s).";
      //optional support
      type types3gpp:ResourceSharingLevel;
    }
    list CNSliceSubnetProfile {
      description " This represents the requirements for the top slice associated with the
      network slice. ";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses TopSliceSubnetProfileGrp;
    }
    list RANSliceSubnetProfile {
      description " This represents the requirements for the top slice associated with the
      network slice. ";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses TopSliceSubnetProfileGrp;
    }
    list TopSliceSubnetProfile {
      description " This represents the requirements for the top slice associated with the
      network slice. ";
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses TopSliceSubnetProfileGrp;
    }
  }
}
<CODE ENDS>
```

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

```
<CODE BEGINS>
module _3gpp-ns-nrm-common {
  yang-version 1.1;
  namespace urn:3gpp:sa5:_3gpp-ns-nrm-common;
  prefix ns3cmn3gpp;

  // import _3gpp-common-subnetwork { prefix subnet3gpp; }
  // import _3gpp-common-yang-types { prefix types3gpp; }
  // import _3gpp-common-top { prefix top3gpp; }

  organization "3GPP SA5";
  contact
    "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";
  description "Common network slice definitions";
  reference "3GPP TS 28.541
    Management and orchestration;
    5G Network Resource Model (NRM);
    Information model definitions for network slice NRM (chapter 6)
    ";

  revision 2021-07-16 { reference CR-0566 ; }
  revision 2021-05-17 {
    description "Introduction of Common Data types";
    reference "CR-0485";
  }
  grouping XLThptGrp {
    list servAttrCom {
      description "This list represents the common properties of service
        requirement related attributes.";
```

```
      reference "GSMA NG.116 corresponding to Attribute categories,
        tagging and exposure";
      config false;
      key idx;
      max-elements 1;
      leaf idx {
        description "Synthetic index for the element.";
        type uint32;
      }
      uses ServAttrComGrp;
    }
    leaf guaThpt {
      description "This attribute describes the guaranteed data rate.";
      type uint64;
      units kbits/s;
    }
    leaf maxThpt {
      description "This attribute describes the maximum data rate.";
      type uint64;
      units kbits/s;
    }
  }
  typedef Tagging-enum {
    type enumeration {
      enum performance;
      enum function;
      enum operation;
    }
  }
  typedef Exposure-enum {
    type enumeration {
      enum API;
      enum KPI;
    }
  }
  typedef Category-enum {
    type enumeration {
      enum character;
      enum scalability;
    }
  }
  typedef Support-enum {
    type enumeration {
      enum NOT_SUPPORTED;
      enum SUPPORTED;
    }
  }
  grouping ServAttrComGrp {
    leaf category {
      description "This attribute specifies the category of a service
        requirement/attribute of GST";
      type Category-enum;
      config false;
    }
    leaf-list tagging {
      description "This attribute specifies the tagging of a service
        requirement/attribute of GST in character category";
      when "../category = 'character'";
      type Tagging-enum;
      config false;
    }
    leaf exposure {
      description "This attribute specifies exposure mode of a service
        requirement/attribute of GST";
      type Exposure-enum;
      config false;
    }
  }
  typedef DeterminCommAvailability {
    type Support-enum;
  }
}
<CODE ENDS>
```

Annex O (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
2020-03	SA#87E	SP-200169	0163	4	F	Correct the parameter sNSSAIList	16.4.0
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
2020-03	SA#87E	SP-200169	0242	-	F	Fix merging errors of the specification	16.4.0
2020-03	SA#87E	SP-200169	0243	1	F	Update NRM attribute definitions	16.4.0
2020-03	SA#87E	SP-200233	0245	2	B	Add the RIM parameters for remote interference management	16.4.0
2020-03	SA#87E	SP-200234	0248	1	F	Update on slice NRM and solution sets	16.4.0
2020-03	SA#87E	SP-200234	0250	1	F	Update of GNBCUUPFunction NRM	16.4.0
2020-03	SA#87E	SP-200232	0253	2	B	Add Stage 3 NRM Info Model definitions for RRMPolicy and PLMNInfo related CRs	16.4.0
2020-03	SA#87E	SP-200178	0254	1	F	Correct CR implementation errors	16.4.0
2020-03	SA#87E	SP-200235	0255	1	F	Add OpenAPI definitions required by the ProvMnS	16.4.0
2020-03	SA#87E	SP-200169	0258		F	Correct errors in yang solution set	16.4.0
2020-03	SA#87E					Correction of implementation errrors	16.4.1
2020-06	SA#88-e	SP-200489	0259	1	F	Update on the RRMpolicyRatio	16.5.0
2020-06	SA#88-e	SP-200493	0260	-	F	Replace DN with better identifier for whitelists and blacklists management	16.5.0
2020-06	SA#88-e	SP-200603	0261	1	B	Add IOC for control of QoS monitoring per QoS flow per UE	16.5.0
2020-06	SA#88-e	SP-200604	0262	1	B	Add IOC for control of GTP-U path QoS monitoring	16.5.0
2020-06	SA#88-e	SP-200489	0263	1	F	Correction of reference	16.5.0
2020-06	SA#88-e	SP-200493	0268	-	B	ANR management for EN-DC architecture	16.5.0
2020-06	SA#88-e	SP-200484	0269	1	F	Clarification on network slice related identifiers	16.5.0
2020-06	SA#88-e	SP-200484	0270	-	F	Stage 3 update for clarification on network slice related identifiers	16.5.0
2020-06	SA#88-e	SP-200484	0274	1	F	Correct sNSSAI definition in XML solution set	16.5.0
2020-06	SA#88-e	SP-200484	0275	1	F	Clarify the NR NRM used for different deployment scenarios	16.5.0
2020-06	SA#88-e	SP-200484	0278	-	F	Add missing notification types to the definition of common notifications	16.5.0
2020-06	SA#88-e	SP-200491	0279	1	A	Update on NRCellDU	16.5.0
2020-06	SA#88-e	SP-200491	0281	1	A	Update Clause 4.2.1.2 Inheritance UML diagram	16.5.0
2020-06	SA#88-e	SP-200490	0283	2	B	new NRM fragment to support RIM stage 2	16.5.0
2020-06	SA#88-e	SP-200490	0284	1	B	new NRM fragment to support RIM stage 3	16.5.0
2020-06	SA#88-e	SP-200489	0285	-	F	Update stage 3 on the RRMpolicyRatio	16.5.0
2020-06	SA#88-e	SP-200605	0286	2	B	Add IOC for configurable 5QIs	16.5.0
2020-06	SA#88-e	SP-200490	0287	1	B	Add IOC for 5QI to DSCP mapping	16.5.0
2020-06	SA#88-e	SP-200493	0289	-	B	Stage3 add the NRM fragment for SON management	16.5.0
2020-06	SA#88-e	SP-200493	0290	-	B	ANR management for EN-DC architecture	16.5.0
2020-06	SA#88-e	SP-200493	0291	1	B	Add the NRM fragment for SON management	16.5.0
2020-06	SA#88-e	SP-200490	0293	-	F	Add CommModelList NRM definition	16.5.0
2020-06	SA#88-e	SP-200490	0294	1	F	Update NRM attribute definitions	16.5.0
2020-06	SA#88-e	SP-200490	0295	1	F	Correct NRM definition in XML solution	16.5.0
2020-06	SA#88-e	SP-200485	0300	1	F	Clarification on the relation of GST, ServiceProfile and SliceProfile	16.5.0
2020-06	SA#88-e	SP-200496	0301	1	B	Add ES coverage relation in NRCellRelation	16.5.0
2020-06	SA#88-e	SP-200490	0302	-	F	Update the decription for RRMPolicy_ and resouceType	16.5.0
2020-06	SA#88-e	SP-200490	0303	-	F	Update definition for attribute localAddress in EP_RP IOC	16.5.0
2020-06	SA#88-e	SP-200486	0305	1	A	Correction of references	16.5.0
2020-06	SA#88-e	SP-200485	0306	1	F	add transport information and slice mapping on backhaul endpoints	16.5.0
2020-06	SA#88-e	SP-200485	0307	-	F	add transport information and slice mapping on backhaul endpoints stage 3	16.5.0
2020-06	SA#88-e	SP-200490	0312	1	F	Update SliceProfile attributes solution 1	16.5.0
2020-06	SA#88-e	SP-200490	0315	1	B	Add configuredMaxTxEIRP on NRSectorCarrier	16.5.0
2020-06	SA#88-e	SP-200490	0316	-	B	Stage 3 Add configuredMaxTxEIRP on NRSectorCarrier	16.5.0
2020-06	SA#88-e	SP-200490	0318	-	F	Update NRM YANG for 28.541	16.5.0
2020-06	SA#88-e	SP-200496	0319	-	B	Add ES coverage relation in NRCellRelation Stage 3	16.5.0
2020-06	SA#88-e	SP-200612	0320	1	F	Update openAPI for NRCellRelation and NRFreqRelation	16.5.0
2020-09	SA#89-e	SP-200729	0321	-	F	Correction of NRM YANG errors	16.6.0
2020-09	SA#89-e	SP-200729	0322	1	F	Correct on NR NRM	16.6.0
2020-09	SA#89-e	SP-200729	0323	-	F	Correct the openAPI definition for NR NRM	16.6.0
2020-09	SA#89-e	SP-200730	0325	-	A	Correct on frequency related IOC	16.6.0
2020-09	SA#89-e	SP-200729	0329	1	B	Add IOC for predefined PCC rules	16.6.0
2020-09	SA#89-e	SP-200729	0330	2	B	Add IOC for predefined PCC rules	16.6.0
2020-09	SA#89-e	SP-200729	0331	-	B	Enable PCF to support configurable 5QIs	16.6.0
2020-09	SA#89-e	SP-200729	0332	-	B	Add IOC for dynamic 5QIs - stage 2	16.6.0
2020-09	SA#89-e	SP-200729	0333	-	B	Add IOC for dynamic 5QIs - stage 3	16.6.0
2020-09	SA#89-e	SP-200729	0334	-	B	Add TCE mapping info in GNBCUCPFunction	16.6.0
2020-09	SA#89-e	SP-200729	0335	-	B	Add TCE mapping info in openAPI solution	16.6.0
2020-09	SA#89-e	SP-200729	0336	-	F	Add missing definitions for perfReq	16.6.0
2020-09	SA#89-e	SP-200754	0338	1	F	Delete supportedAccessTech to align with GST	16.6.0
2020-09	SA#89-e	SP-200724	0339	-	F	Correction on duplicated annex numbering	16.6.0

2020-09	SA#89-e	SP-200729	0345	-	F	Update NRM attribute definitions	16.6.0
2020-09	SA#89-e	SP-200749	0362	-	F	Deleting SupportedAccessTech - Stage 3 - XML	16.6.0
2020-09	SA#89-e	SP-200724	0368	1	F	Add relation between transport and application level endpoints	16.6.0
2020-09	SA#89-e	SP-200724	0369	-	F	Add relation between transport and application level endpoints stage 3	16.6.0
2020-09	SA#89-e	SP-200729	0370	1	F	Cleanup stage 2 editorial issue and stage 3 yaml error	16.6.0
2020-09	SA#89-e	SP-200749	0371	-	F	Add clarifying note to ServiceProfile	16.6.0
2020-09	SA#89-e	SP-200752	0337	-	B	Add the MLB support indicator in NRcellrelation	17.0.0
2020-09	SA#89-e	SP-200749	0341	1	F	Update maxNumberofConns	17.0.0
2020-09	SA#89-e	SP-200749	0342	-	B	Add NB-IoT support in ServiceProfile	17.0.0
2020-09	SA#89-e	SP-200729	0366	1	B	Addition of attribute for network slice supporting maximum of data volume	17.0.0
2020-11						No technical changes. Cleanup of diverse issues in order to improve performance of the file: hidden XML, watermarks,etc..	17.0.1
2020-12	SA#90e	SP-201057	0380	-	A	Correct the definition for configurable5QI and dynamic5QI	17.1.0
2020-12	SA#90e	SP-201066	0382	1	F	Change RACH control attributes from beam to cell	17.1.0
2020-12	SA#90e	SP-201045	0384	1	A	Move Distributed RACH control IOC from CU to DU	17.1.0
2020-12	SA#90e	SP-201045	0386	2	A	Move Distributed PCI control IOC from DU to CU	17.1.0
2020-12	SA#90e	SP-201057	0388	-	A	Correction of cell neighbour relations related attributes in openAPI solution	17.1.0
2020-12	SA#90e	SP-201057	0393	-	A	Correction of NRM YANG errors	17.1.0
2020-12	SA#90e	SP-201057	0395	1	A	Correct Network slice NRM	17.1.0
2020-12	SA#90e	SP-201053	0399	1	A	Fix description related to service profile	17.1.0
2020-12	SA#90e	SP-201050	0405	-	A	Add containment relationship for network slice IOCs	17.1.0
2020-12	SA#90e	SP-201050	0406	-	F	Add containment relationship for network slice IOCs stage 3	17.1.0
2020-12	SA#90e	SP-201045	0407	-	F	Add subclause reference of MRO related attribute	17.1.0
2020-12	SA#90e	SP-201089	0410	1	A	Correction of NRM YANG errors	17.1.0
2020-12	SA#90e	SP-201089	0412	-	A	YANG improvements	17.1.0
2020-12	SA#90e	SP-201056	0414	-	A	Add serviceProfileId and sliceProfileId to stage 3 yaml	17.1.0
2020-12	SA#90e	SP-201089	0419	-	A	Update notifyThresholdCrossing to be a common notification.	17.1.0
2020-12	SA#90e	SP-201089	0421	-	A	pLMNInfoList faulty attribute definition	17.1.0
2020-12	SA#90e	SP-201089	0423	-	A	Fix containment relationship for EP_Transport IOC	17.1.0
2021-03	SA#91e	SP-210153	0432	1	A	Correction on Dynamic5QISet IOC based on LS reply from SA2	17.2.0
2021-03	SA#91e	SP-210154	0435	3	A	Correct the NF name in definition of EP_NgU	17.2.0
2021-03	SA#91e	SP-210153	0440	-	A	Add missing inheritance description information in the attribute definition for several IOCs	17.2.0
2021-03	SA#91e	SP-210153	0442	2	A	Correct multiplicity issue for several attributes of NR NRM	17.2.0
2021-03	SA#91e	SP-210146	0445	2	A	Fix containment relationship for EP_Transport IOC	17.2.0
2021-03	SA#91e	SP-210155	0457	-	C	Remove the XML Solution set	17.2.0
2021-03	SA#91e	SP-210144	0459	1	B	Update the information model definitions for network slice NRM	17.2.0
2021-03	SA#91e	SP-210143	0461	1	A	Update of the PCI and DESManagementFunction	17.2.0
2021-03	SA#91e	SP-210154	0467	1	A	Correction to NSI and NSSI state management	17.2.0
2021-03	SA#91e	SP-210155	0472	-	A	YANG compilation error and missing stage 2 corrections	17.2.0
2021-03	SA#91e	SP-210146	0474	-	A	Fix compilation and other errors	17.2.0
2021-03	SA#91e					Fixing CR implementation error in E.5.13	17.2.1
2021-06	SA#92e	SP-210407	0430	4	F	Correction of ServiceProfile attributes	17.3.0
2021-06	SA#92e	SP-210410	0479	1	B	Add positioning support in RANSliceSubnetProfile	17.3.0
2021-06	SA#92e	SP-210410	0480	1	B	OpenAPI of adding positioning support in RANSliceSubnetProfile	17.3.0
2021-06	SA#92e	SP-210410	0481	1	B	Add synchronicity support in RANSliceSubnetProfile	17.3.0
2021-06	SA#92e	SP-210410	0482	1	B	OpenAPI of adding synchronicity support in RANSliceSubnetProfile	17.3.0
2021-06	SA#92e	SP-210410	0485	1	C	perfReq mapping to domain specific attributes	17.3.0
2021-06	SA#92e	SP-210410	0486	1	B	Add reliability to CN SliceProfile	17.3.0
2021-06	SA#92e	SP-210401	0487	1	B	Enhancement of NRM definition for the NWDAF - Stage 2	17.3.0
2021-06	SA#92e	SP-210401	0488	1	B	OpenAPI Enhancement of NRM definition for the NWDAF	17.3.0
2021-06	SA#92e	SP-210411	0490	-	A	Correct the description for GNBDUFunction and EP_NgC	17.3.0
2021-06	SA#92e	SP-210401	0491	1	F	Improve the readability of EP_Transport	17.3.0
2021-06	SA#92e	SP-210465	0493	2	B	Add energyEfficiency attribute	17.3.0
2021-06	SA#92e	SP-210410	0495	1	B	enhance 5GC NRM to support network slice admission control	17.3.0
2021-06	SA#92e	SP-210407	0498	1	F	Add note for RRMPolicy	17.3.0
2021-06	SA#92e	SP-210467	0499	1	F	Inclusive language review	17.3.0
2021-06	SA#92e	SP-210406	0501	1	A	Fix editorial issue of network slice NRM	17.3.0
2021-06	SA#92e	SP-210406	0503	1	A	fix inheritance relation of network slice NRM	17.3.0
2021-06	SA#92e	SP-210406	0506	1	C	Correction of 5QI definitions in NRM	17.3.0
2021-06	SA#92e	SP-210410	0508	-	F	Correction on mapping GST attributes	17.3.0
2021-06	SA#92e	SP-210411	0510	-	A	Correct inconsistencies in definitions around network slice management	17.3.0
2021-06	SA#92e	SP-210406	0514	1	A	Correction to definition for domain centralized SON	17.3.0
2021-09	SA#93e	SP-210871	0518	-	A	YANG NR-NRM model structure repair and cleanup	17.4.0

2021-09	SA#93e	SP-210870	0520	-	C	Use of TopSliceSubnetProfile	17.4.0
2021-09	SA#93e	SP-210885	0522	-	A	Deprecate Top-Attr and use Top instead	17.4.0
2021-09	SA#93e	SP-210885	0524	-	A	Fix incorrect attributes inheritance description	17.4.0
2021-09	SA#93e	SP-210870	0525	-	B	Add survival time to CNSliceProfile	17.4.0
2021-09	SA#93e	SP-210867	0526	1	B	Add NRM IOC definitions for N5, N70 and N71 reference points	17.4.0
2021-09	SA#93e	SP-210867	0527	1	B	Adding NRM for N33	17.4.0
2021-09	SA#93e	SP-210867	0528	-	B	Enhance 5GC NRM to support 5G_DDNMF	17.4.0
2021-09	SA#93e	SP-210871	0530	-	A	Remove the attribute definition which is not used	17.4.0
2021-09	SA#93e	SP-210882	0531	1	B	Add NPN Identity on NR cell to support access control for NPN UEs	17.4.0
2021-09	SA#93e	SP-210871	0534	1	A	Fix the issue caused by the updated NetworkSliceSubnet inheritence relationship	17.4.0
2021-09	SA#93e	SP-210867	0535	1	F	Update logicInterfaceId of EP_transport	17.4.0
2021-09	SA#93e	SP-210870	0539	1	B	Add radio spectrum support in slicing profiles	17.4.0
2021-09	SA#93e	SP-210870	0542	-	C	Update maxPktSize and determinComm to support UL and DL requirements	17.4.0
2021-09	SA#93e	SP-210870	0543	-	F	Remove obsolete coverageArea attribute in TopSliceSubnetProfile	17.4.0
2021-09	SA#93e	SP-210871	0545		A	Correction for attribute description of servAttrCom	17.4.0
2021-09	SA#93e	SP-210871	0547	-	A	Correcion of YAML references	17.4.0
2021-09	SA#93e	SP-210871	0548	-	F	Revise description of NextHopInfo and qosProfileRefList attribute in EP_transport IOC	17.4.0
2021-09	SA#93e	SP-210867	0549		C	Update resourceType PRB for UL (Uplink) and DL (Downlink)	17.4.0
2021-09	SA#93e	SP-210887	0551	-	F	Correction of ServiceProfile	17.4.0
2021-09	SA#93e	SP-210887	0554	-	B	Enhance 5G Core AMF NRM fragment	17.4.0
2021-09	SA#93e	SP-210885	0555	-	A	Remove isINEF attribute from NEFFunction IOC	17.4.0
2021-09	SA#93e	SP-210871	0556	-	A	YANG updates to correct YANG merging problems	17.4.0
2021-09	SA#93e	SP-210885	0557	1	A	Fix inconsistent clauses and attributes used in TS 38.211 and TS 28.541	17.4.0
2021-09	SA#93e	SP-210871	0558	1	A	Moving RIM monitoring related attributes to NRCellDU	17.4.0
2021-09	SA#93e	SP-210867	0559	1	C	Extend NRM fragment to support EP_transport for mid-haul	17.4.0
2021-09	SA#93e	SP-210867	0562	-	B	Enhance 5G Core managed NF Profile NRM fragment	17.4.0
2021-09	SA#93e	SP-210867	0564	-	F	Delete AMFInfo datatype in NRM fragment	17.4.0
2021-09	SA#93e	SP-210867	0566	1	F	Correction of YANG Solution set	17.4.0
2021-09	SA#93e	SP-210867	0568	-	F	Add missing openAPI definition update for S5-213508	17.4.0
2021-12	SA#94e	SP-211471	0468	3	B	Update NR NRM to support MOCN network sharing scenario	17.5.0
2021-12	SA#94e	SP-211472	0571	-	A	Align different (abbreviated) names for support qualifier to S	17.5.0
2021-12	SA#94e	SP-211454	0575	1	A	Clarify the usage of pLMNId in first entry in pLMNInfoList	17.5.0
2021-12	SA#94e	SP-211452	0576	1	B	Add Stage 2 solutions to support D-LBO	17.5.0
2021-12	SA#94e	SP-211452	0577	1	B	Add Stage 3 solutions to support D-LBO	17.5.0
2021-12	SA#94e	SP-211466	0578	-	C	Update latency to support UL and DL requirements	17.5.0
2021-12	SA#94e	SP-211466	0579	-	F	Align attribute names for CNSliceSubnetProfile	17.5.0
2021-12	SA#94e	SP-211473	0580	-	F	YAML update for RRMPolicy	17.5.0
2021-12	SA#94e	SP-211473	0581	1	B	Add attribute networkSliceSubnetType for NetworkSliceSubnet IOC	17.5.0
2021-12	SA#94e	SP-211473	0582	1	C	Add maxnumber of PDU Sessions in NsacfInfoSnssai	17.5.0
2021-12	SA#94e	SP-211473	0583	1	C	Add serving area information for NSACF discovery and selection	17.5.0
2021-12	SA#94e	SP-211473	0584	1	C	Enhance NRM to support local NEF selection	17.5.0
2021-12	SA#94e	SP-211473	0585	1	C	Update NRM to support EASDF	17.5.0
2021-12	SA#94e	SP-211466	0587	1	F	Update relationship between GST and Network Slice NRM fragment	17.5.0
2021-12	SA#94e	SP-211454	0589	1	A	cNSIId description clarificaiton	17.5.0
2021-12	SA#94e	SP-211454	0591	1	A	Correct NRM for AMFRegion and AMFSet	17.5.0
2021-12	SA#94e	SP-211457	0592		B	Adding transport view NRM from 5GC to EDN	17.5.0
2021-12	SA#94e	SP-211462	0595	1	A	DMRO correction	17.5.0
2021-12	SA#94e	SP-211466	0599	1	D	Introduce missing GST references	17.5.0
2021-12	SA#94e	SP-211473	0600	1	B	Enhance 5G Core managed NF Profile NRM fragment (Stage 2)	17.5.0
2021-12	SA#94e	SP-211473	0601	1	B	5GC NRM enhancements for AMFFunction and ManagedNFProfile (Stage 3)	17.5.0
2021-12	SA#94e	SP-211473	0602	1	B	NR NRM additions to support 5GC enhancements (Stage 3)	17.5.0
2021-12	SA#94e	SP-211454	0604	-	A	Correct PLMNInfo support qualifier	17.5.0
2021-12	SA#94e	SP-211464	0606	1	A	Clarify tenant relationship with ServiceProfileId	17.5.0
2021-12	SA#94e	SP-211473	0607	-	F	Correction of YANG Solution set	17.5.0
2021-12	SA#94e	SP-211474	0608	1	B	NRM for CHO	17.5.0
2021-12	SA#94e	SP-211474	0609	1	B	NRM for CHO Stage 3	17.5.0
2021-12	SA#94e	SP-211474	0610	1	B	NRM for DAPS handover	17.5.0
2021-12	SA#94e	SP-211474	0611	1	B	NRM for DAPS Stage 3	17.5.0
2021-12	SA#94e	SP-211466	0612	-	F	Remove editor notes	17.5.0
2021-12	SA#94e	SP-211473	0613	-	F	Update 5GC NRM for 5G_DDNMF reference point	17.5.0

2021-12	SA#94e	SP-211463	0619	1	D	Update inclusive language modification for TS 28.541	17.5.0
2021-12	SA#94e	SP-211475	0621	-	A	Correct the wrong reference for TS 32.160	17.5.0
2021-12	SA#94e	SP-211471	0622	-	B	Add YAML solution set for NG-RAN MOCN network sharing scenarios	17.5.0
2021-12	SA#94e	SP-211472	0624	-	A	Fix stage3 definition for plmnId	17.5.0
2021-12	SA#94e	SP-211466	0626	1	B	network slice protection on N6 interface	17.5.0
2021-12	SA#94e	SP-211466	0627	1	B	network slice specific authentication	17.5.0
2021-12	SA#94e	SP-211473	0629	1	B	Enhance NRM of UDM function	17.5.0
2021-12	SA#94e	SP-211473	0630	1	F	Stage3 Update for UPF and PCF	17.5.0
2021-12	SA#94e	SP-211473	0631	1	F	Introduce missing attribute nRFreqRelationRef in table of attribute properties (stage 2)	17.5.0
2021-12	SA#94e	SP-211473	0634	1	F	Correct attribute in IOC NRCellRelation (stage 3)	17.5.0
2021-12	SA#94e	SP-211473	0636	1	B	Enhance 5G Core managed NF Profile NRM fragment (Stage 2)	17.5.0
2021-12	SA#94e	SP-211473	0637	1	B	5GC NRM enhancements for ManagedNFProfile (Stage 3)	17.5.0
2021-12	SA#94e	SP-211475	0638	-	A	Correct spelling of Attribute properties	17.5.0
2022-03	SA#95e	SP-220182	0633	2	C	Update maximumDeviationHoTrigger	17.6.0
2022-03	SA#95e	SP-220168	0641	-	F	Fix stage3 definition for 5G_DDNMF	17.6.0
2022-03	SA#95e	SP-220168	0643	-	F	YANG corrections	17.6.0
2022-03	SA#95e	SP-220168	0644	-	F	Fixing lists errors in AmfFunction-Single (stage 3)	17.6.0
2022-03	SA#95e	SP-200176	0645	1	F	Update RANSliceSubnetProfile attributes	17.6.0
2022-03	SA#95e	SP-220182	0649	-	F	Correct NRM fragment for DMRO Management	17.6.0
2022-03	SA#95e	SP-220173	0650	1	B	Add Stage 2 solutions to support ECM	17.6.0
2022-03	SA#95e	SP-220176	0651	1	F	Update energy efficiency attribute	17.6.0
2022-03	SA#95e	SP-220184	0652	1	F	Alignment on NR NRM for MOCN network sharing	17.6.0
2022-03	SA#95e	SP-220184	0653	1	B	Add administrativeState attribute in NROperatorCellDU	17.6.0
2022-03	SA#95e	SP-220179	0655	-	A	Remove incorrect reference to TS 22.104	17.6.0
2022-03	SA#95e	SP-220168	0658	1	B	NRM enhacements for SMFFunction	17.6.0
2022-03	SA#95e	SP-220182	0659	1	B	Add C-SON CCO NRM model stage3	17.6.0
2022-03	SA#95e	SP-220182	0660	1	B	Add C-SON CCO NRM model stage2	17.6.0
2022-03	SA#95e	SP-220176	0666	1	F	Clean up of eMA5SLA	17.6.0
2022-03	SA#95e	SP-200168	0667	-	F	Update 5G NRM to solve CR clash in Figure 5.2.1.2-2	17.6.0
2022-03	SA#95e	SP-200168	0670	1	B	NRM enhancements for the SMFFunction (stage 3)	17.6.0
2022-03	SA#95e	SP-220178	0672	-	F	Correct YANG Network Slice NRM solution set reference	17.6.0
2022-03	SA#95e	SP-200168	0674	1	F	Update 5GC NRM for 5G_DDNMF	17.6.0
2022-03	SA#95e	SP-220179	0678	-	A	Correct YANG mapping in TS document	17.6.0
2022-03	SA#95e	SP-220168	0679	-	F	Correct NR YAML in TS document	17.6.0
2022-03	SA#95e	SP-220168	0680	-	F	Correct 5GC YAML in TS document	17.6.0
2022-03	SA#95e	SP-220168	0681	-	F	Correct Network Slicing YAML in TS document	17.6.0
2022-03	SA#95e	SP-220173	0682	-	B	Add Stage 3 solutions to support ECM	17.6.0
2022-03	SA#96	SP-220507	0642	2	F	Update Figure L.2.1 and accompanying paragraph.	17.7.0
2022-03	SA#96	SP-220508	0683	-	F	Correct maximumDeviationHoTrigger for D-LBO	17.7.0
2022-03	SA#96	SP-220497	0685	-	A	Diagram fix for NRM fragment for RRM policies	17.7.0
2022-03	SA#96	SP-220497	0689	-	A	Fixing OpenAPI Discoverability issue in stage 3 5gcNrm.yaml	17.7.0
2022-03	SA#96	SP-220497	0690	-	A	Fixing OpenAPI Discoverability issue in stage 3- nrNrm.yaml	17.7.0
2022-03	SA#96	SP-220497	0691	-	A	Fixing OpenAPI Discoverability issue in stage 3 sliceNrm.yaml	17.7.0
2022-03	SA#96	SP-220498	0693	-	A	CT OpenAPI file relative-path URI references and dependence change for 5gcNrm.yaml	17.7.0
2022-03	SA#96	SP-220564	0694	-	F	Fixing a few issues with attribute related to nextHopInfoList in EP_transport	17.7.0
2022-03	SA#96	SP-220498	0698	1	A	OpenAPI file name and dependence change for 5gcNrm.yaml	17.7.0
2022-03	SA#96	SP-220498	0699	1	A	OpenAPI file name and dependence change for nrNrm.yaml	17.7.0
2022-03	SA#96	SP-220498	0700	1	A	OpenAPI file name and dependence change for sliceNrm.yaml	17.7.0
2022-03	SA#96	SP-220498	0702	-	A	Correction to RRMPolicy_ IOC reference in RRMPolicyRatio IOC	17.7.0
2022-03	SA#96	SP-220498	0704	-	A	Add attribute properties for NetworkSliceSubnet attribute priorityLabel	17.7.0
2022-03	SA#96	SP-220564	0705	-	F	Fix to change Support Qualifier to S	17.7.0
2022-03	SA#96	SP-220564	0706	-	F	Define LogicInterfaceInfo datatype and fix attribute properties for logicInterfaceInfo	17.7.0
2022-03	SA#96	SP-220564	0708	1	F	Fixing attribute properties for ServiceProfile attribute networkSliceSharingIndicator	17.7.0
2022-03	SA#96	SP-220510	0710	1	A	Correct isOrdered-isUnique for multivalue attributes	17.7.0
2022-03	SA#96	SP-220499	0712	1	B	Network slice subnet provider capability IOC	17.7.0
2022-03	SA#96	SP-220507	0715	-	F	Correction on two SLA attributes	17.7.0
2022-03	SA#96	SP-220507	0716	-	F	Correction on attribute latency of SubnetProfiles	17.7.0
2022-03	SA#96	SP-220510	0719	-	A	Correction on minor errors in nrNRM.yaml	17.7.0
2022-03	SA#96	SP-220510	0721	-	A	Correction on the attribution definition in the wrong yaml file	17.7.0
2022-03	SA#96	SP-220499	0722	-	B	Add feasibility check NRM fragment	17.7.0
2022-03	SA#96	SP-220509	0723	-	F	Address the unnecessary reference for the yaml file	17.7.0
2022-03	SA#96	SP-220510	0727	-	A	Fix BWP association in NRCellDU	17.7.0
2022-03	SA#96	SP-220510	0729	-	A	Update 5QI set description - YANG module	17.7.0

2022-03	SA#96	SP-220510	0731	-	A	Update 5QI set reference attribute definition	17.7.0
2022-09	SA#97e	SP-220849	0740	1	F	FiveQICharacteristics inheritance issue and reference issue in stage 3	17.8.0
2022-09	SA#97e	SP-220859	0742	1	F	Fix inconsistency in AMFFunction stage 2 and stage 3	17.8.0
2022-09	SA#97e	SP-220849	0744	-	F	Correction to DESManagementFunction and CESManagementFunction	17.8.0
2022-09	SA#97e	SP-220849	0747	1	F	Correction to serviceType attribute	17.8.0
2022-09	SA#97e	SP-220859	0757	1	F	Update stage2 and stage3 definition for FeasibilityCheckAndReservationJob	17.8.0
2022-09	SA#97e	SP-220859	0759	-	F	Add missing notifyMOIChanges in configuration notification table	17.8.0
2022-09	SA#97e	SP-220861	0761	-	F	Correction on two SLA attributes	17.8.0
2022-09	SA#97e	SP-220859	0766	1	F	Update EASDF IOC	17.8.0
2022-09	SA#97e	SP-220849	0768	1	F	Correction to coverageAreaTAList	17.8.0
2022-09	SA#97e	SP-220849	0769	-	F	YANG Corrections	17.8.0
2022-09	SA#97e	SP-220849	0771	-	F	Add missing attributes n6Protection and nssaaSupport defined in CNSliceSubnetProfile to TopSliceSubnetProfile	17.8.0
2022-09	SA#97e	SP-220849	0773	-	F	fix TaiList issues in stage 3 in TS28541_5gcNrm.yaml	17.8.0
2022-09	SA#97e					Alignment with code in FORGE	17.8.1

History

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