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-5g-common-yang-types.yang

<CODE BEGINS>

module \_3gpp-5g-common-yang-types {

yang-version 1.1;

namespace "urn:3gpp:sa5:\_3gpp-5g-common-yang-types";

prefix "types5g3gpp";

import ietf-yang-types { prefix yang; }

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 2023-05-10 { reference CR-0916; }

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 yang:hex-string { length 6;

}

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;

}

}

}

<CODE ENDS>

## H.5.1a module \_3gpp-5gc-nrm-affunction.yang

<CODE BEGINS>

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";

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

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 2023-04-26 { reference CR-0916; }

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

revision 2019-05-15 {reference "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;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<CODE ENDS>

## 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.yang

<CODE BEGINS>

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;

}

}

}

<CODE ENDS>

## H.5.7 module \_3gpp-5gc-nrm-ep.yang

<CODE BEGINS>

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;

}

}

}

}

<CODE ENDS>

## H.5.8 module \_3gpp-5gc-nrm-externalnrffunction.yang

<CODE BEGINS>

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; }

}

}

<CODE ENDS>

## H.5.9 module \_3gpp-5gc-nrm-externalnssffunction.yang

<CODE BEGINS>

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;

}

}

}

<CODE ENDS>

## H.5.10 module \_3gpp-5gc-nrm-lmffunction.yang

<CODE BEGINS>

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;

}

}

}

<CODE ENDS>

## H.5.11 module \_3gpp-5gc-nrm-n3iwffunction.yang

<CODE BEGINS>

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;

}

}

}

<CODE ENDS>

## H.5.12 module \_3gpp-5gc-nrm-nfprofile.yang

<CODE BEGINS>

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 2023-02-14 { reference CR-0891; }

revision 2019-06-17 { reference "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 types3gpp:TaiGrp;

}

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 types3gpp:TaiGrp;

}

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 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;

}

}

}

<CODE ENDS>

## 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

<CODE BEGINS>

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 2023-04-26 { reference CR-0916; }

revision 2020-11-08 { 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;

}

}

}

<CODE ENDS>

## H.5.16 module \_3gpp-5gc-nrm-nssffunction.yang

<CODE BEGINS>

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 2023-04-26 { reference CR-0916; }

revision 2020-11-08 { 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;

description "Profile definition of a Managed NF (See TS 23.501)";

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;

}

}

}

<CODE ENDS>

## H.5.17 module \_3gpp-5gc-nrm-nwdaffunction.yang

<CODE BEGINS>

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 2023-04-26 { reference CR-0916; }

revision 2020-11-08 { 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;

description "Profile definition of a Managed NF (See TS 23.501)";

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;

}

}

}

<CODE ENDS>

## H.5.18 module \_3gpp-5gc-nrm-pcffunction.yang

<CODE BEGINS>

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 2023-04-26 { reference CR-0916; }

revision 2020-11-08 { reference CR-0412 ; } 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;

}

}

}

<CODE ENDS>

## H.5.19 module \_3gpp-5gc-nrm-seppfunction.yang

<CODE BEGINS>

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; }

}

}

<CODE ENDS>

## H.5.19a module \_3gpp-5gc-nrm- externalseppfunction.yang

<CODE BEGINS>

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";

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

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 2023-04-26 { reference CR-0916; }

revision 2019-11-17 {reference "initial revision"; }

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;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<CODE ENDS>

## H.5.20 module \_3gpp-5gc-nrm-smffunction.yang

<CODE BEGINS>

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.";

reference "3GPP TS 28.541";

revision 2023-04-26 { reference CR-0916; }

revision 2020-11-08 { 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;

description "Profile definition of a Managed NF (See TS 23.501)";

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;

}

}

}

<CODE ENDS>

## H.5.21 module \_3gpp-5gc-nrm-smsffunction.yang

<CODE BEGINS>

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;

}

}

}

<CODE ENDS>

## H.5.22 module \_3gpp-5gc-nrm-udmfunction.yang

<CODE BEGINS>

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 2023-04-26 { reference CR-0916; }

revision 2020-11-08 { 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;

description "Profile definition of a Managed NF (See TS 23.501)";

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;

}

}

}

<CODE ENDS>

## H.5.23 module \_3gpp-5gc-nrm-udrfunction.yang

<CODE BEGINS>

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 2023-04-26 { reference CR-0916; }

revision 2020-11-08 { 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;

description "Profile definition of a Managed NF (See TS 23.501)";

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;

}

}

}

<CODE ENDS>

## H.5.24 module \_3gpp-5gc-nrm-udsffunction.yang

<CODE BEGINS>

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 2023-04-26 { reference CR-0916; }

revision 2020-11-08 { 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; }

}

}

<CODE ENDS>

## H.5.25 module \_3gpp-5gc-nrm-upffunction.yang

<CODE BEGINS>

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 2023-04-26 { reference CR-0916; }

revision 2020-11-08 { 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;

description "Profile definition of a Managed NF (See TS 23.501)"; 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;

}

}

}

<CODE ENDS>

## H.5.26 module \_3gpp-5gc-nrm-scpfunction.yang

<CODE BEGINS>

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";

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

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 2023-04-26 { reference CR-0916; }

revision 2019-10-24 { reference "initial revision"; }

grouping SCPFunctionGrp {

uses mf3gpp:ManagedFunctionGrp;

leaf address {

description "The host address of the SCP.";

type inet:host;

}

list supportedFuncList {

min-elements 1;

key "function";

description "This parameter lists functionalities supported by a SCP.

Refer to TS 23.501 ";

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;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<CODE ENDS>

## 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 2023-04-26 { reference CR-0916; }

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;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<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 2023-04-26 { reference CR-0916; }

revision 2020-11-08 { 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; }

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.

The 5QI set definition supports multiple deployment scenarios. The sets can

be name contained by SubNetwork ManagedElement, GNBDUFunction,

GNBCUUPFunction and GNBCUCPFunction. Sets are then referenced by attribute

(configurable5QISetRef) in applicable MOIs. For consistency it is

recommended that referenced 5QI sets be defined within the same subtree.";

reference "3GPP TS 28.541";

revision 2022-11-02 { reference "CR-0753" ; }

revision 2022-07-28 { reference "CR-0770"; }

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

<CODE BEGINS>

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 2023-04-26 { reference CR-0916; }

revision 2020-10-04 { 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;

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;

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;

}

}

<CODE ENDS>

## 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 2022-07-28 { reference "CR-0770"; }

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

If the class ManagedElement and the underlying hierarchy is contained under a SubNetwork all YANG modules containing IOCs that can be contained under the ManagedElement directly or under other IOCs contained by the ManagedElement and the YANG module for ManagedElement itself shall be mounted at the mountpoint "children-of-SubNetwork" in the YANG module \_3gpp-common-subnetwork.

See IETF RFC 8528 [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.

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: 18.4.0

description: >-

OAS 3.0.1 specification of the Slice NRM

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externalDocs:

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

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

paths: {}

components:

schemas:

#------------ Type definitions ---------------------------------------------------

Float:

type: number

format: float

MobilityLevel:

type: string

enum:

- STATIONARY

- NOMADIC

- RESTRICTED MOBILITY

- FULLY MOBILITY

SynAvailability:

type: string

enum:

- NOT SUPPORTED

- BETWEEN BS AND UE

- BETWEEN BS AND UE & UE AND UE

PositioningAvailability:

type: array

items:

type: string

enum:

- CIDE-CID

- OTDOA

- RF FINGERPRINTING

- AECID

- HYBRID POSITIONING

- NET-RTK

Predictionfrequency:

type: string

enum:

- PERSEC

- PERMIN

- PERHOUR

SharingLevel:

type: string

enum:

- SHARED

- NON-SHARED

NetworkSliceSharingIndicator:

type: string

enum:

- SHARED

- NON-SHARED

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: array

items:

type: integer

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: array

items:

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: array

items:

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

description:

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

dLMaxPktSize:

type: integer

uLMaxPktSize:

type: integer

nROperatingBands:

type: array

items:

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: array

items:

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

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'

v2XCommModels:

$ref: '#/components/schemas/V2XCommModels'

coverageArea:

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

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:

sliceProfileId:

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

systemName:

type: string

portName:

type: string

routingProtocol:

type: string

enum:

- RIP

- IGMP

- OSPF

- EGP

- EIGRP

- BGP

- IS-IS

ConnectionPointInfo:

type: object

properties:

connectionPointId:

type: string

connectionPointIdType:

type: string

enum:

- VLAN

- MPLS

- SEGMENT

- IPV4

- IPV6

- ATTACHMENT\_CIRCUIT

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'

FeasibilityCheckAndReservationJob:

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

NetworkSliceController:

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

NetworkSliceSubnetController:

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

networkSliceControllerRef:

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

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

networkSliceSubnetControllerRef:

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

EP\_Transport-Single:

allOf:

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

- type: object

properties:

attributes:

type: object

properties:

ipAddress:

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

localLogicalInterfaceInfo:

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

qosProfile:

type: string

epApplicationRefs:

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

connectionPointRefList:

type: array

items:

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

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'

NetworkSliceController-Single:

allOf:

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

- type: object

properties:

attributes:

type: object

properties:

inputServiceProfile:

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

serviceProfileId:

type: string

operationalState:

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

administrativeState:

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

availabilityStatus:

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

processMonitor:

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

networkSliceRef:

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

NetworkSliceSubnetController-Single:

allOf:

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

- type: object

properties:

attributes:

type: object

properties:

inputSliceProfile:

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

sliceProfileId:

type: string

operationalState:

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

administrativeState:

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

availabilityStatus:

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

processMonitor:

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

networkSliceSubnetRef:

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

#-------- 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'

NetworkSliceController-Multiple:

type: array

items:

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

NetworkSliceSubnetController-Multiple:

type: array

items:

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

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

- $ref: '#/components/schemas/NetworkSliceSubnetController-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-0770; }

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-0770; }

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.";

default LOCKED;

type types3gpp:AdministrativeState;

}

list nsInfo {

description "This list represents the properties of network service

information corresponding to the network slice subnet instance.";

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

config false;

key nSInstanceId;

max-elements 1;

uses NsInfoGrp;

}

list sliceProfileList {

description "List of SliceProfiles supported by the network slice

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

shall contain the same datatype representing slice profile requirements:

TopSliceSubnetProfile, RANSliceSubnetProfile or CNSliceSubnetProfile.

Members of the list may contain TopSliceSubnetProfile datatype

only when this attribute (sliceProfileList) belongs to

a NetworkSliceSubnet that is directly referenced by a NetworkSlice";

key sliceProfileId;

uses SliceProfileGrp;

}

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 2023-04-26 { reference CR-0916; }

revision 2021-07-20 { reference CR-0566; }

revision 2021-05-05 { 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):   
QoS model usage for NG-RAN

# O.1 Overview

The Configurable 5QI set IOC (as defined in 5.3.75) provides flexibility to support multiple scenarios:

- Configurable 5QI sets can be name contained by SubNetwork, ManagedElement, GNBDUFunction, GNBCUUPFunction and GNBCUCPFunction.

- Sets are referenced by attributes (configurable5QISetRef) in applicable MOIs.

Specific containment and/or referencing may be appropriate for certain scenarios.

# O.2 General usage

For consistency, referenced 5QI sets can be defined within the same subtree (see Figure 4.2.1.1-8) as follows:

- a Configurable5QISet instance contained by ManagedEntity does not need a reference from the ManagedEntity instance which contains it.

- a Configurable5QISet instance contained by ManagedElement is only referenced by ManagedFunction instances contained within that ManagedElement.

- a Configurable5QISet instance contained by Subnetwork is only referenced by ManagedFunction instances contained within the same Subnetwork.

- a Configurable5QISet instance contained by ManagedFunction is only used by that ManagedFunction instance.

Annex P (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 |
| 2022-03 | SA#96 | SP-220511 | 0711 | - | B | Access specific GST configuration | 18.0.0 |
| 2022-09 | SA#97e | SP-220847 | 0732 | - | B | Enhance 5G Core managed NF Profile NRM fragment | 18.1.0 |
| 2022-09 | SA#97e | SP-220847 | 0733 | - | B | NRM enhancements for UPFFunction | 18.1.0 |
| 2022-09 | SA#97e | SP-220847 | 0734 | - | C | NRM enhancements for NSSFFunction | 18.1.0 |
| 2022-09 | SA#97e | SP-220847 | 0735 | 1 | B | NRM enhancements for PCFFunction | 18.1.0 |
| 2022-09 | SA#97e | SP-220847 | 0736 | 1 | B | NRM enhancements for UDMFunction | 18.1.0 |
| 2022-09 | SA#97e | SP-220847 | 0737 | 1 | B | NRM enhancements for UDRFunction | 18.1.0 |
| 2022-09 | SA#97e | SP-220849 | 0741 | 1 | A | FiveQICharacteristics inheritance issue and reference issue in stage 3 | 18.1.0 |
| 2022-09 | SA#97e | SP-220859 | 0743 | 1 | A | Fix inconsistency in AMFFunction stage 2 and stage 3 | 18.1.0 |
| 2022-09 | SA#97e | SP-220849 | 0745 | - | A | Correction to DESManagementFunction and CESManagementFunction | 18.1.0 |
| 2022-09 | SA#97e | SP-220849 | 0748 | 1 | A | Correction to serviceType attribute | 18.1.0 |
| 2022-09 | SA#97e | SP-220847 | 0755 | 1 | B | Add BWP Set configuration support in NRM (stage 2) | 18.1.0 |
| 2022-09 | SA#97e | SP-220847 | 0756 | - | B | Add BWP Set configuration support in NRM (stage 3, YANG) | 18.1.0 |
| 2022-09 | SA#97e | SP-220859 | 0758 | 1 | A | Update stage2 and stage3 definition for FeasibilityCheckAndReservationJob | 18.1.0 |
| 2022-09 | SA#97e | SP-220859 | 0760 | - | A | Add missing notifyMOIChanges in configuration notification table | 18.1.0 |
| 2022-09 | SA#97e | SP-220861 | 0762 | - | A | Correction on two SLA attributes | 18.1.0 |
| 2022-09 | SA#97e | SP-220847 | 0764 | 1 | B | Add BWP set support to NRM (Stage3, YAML) | 18.1.0 |
| 2022-09 | SA#97e | SP-220847 | 0765 | 1 | B | Update NWDAFFunction IOC to support management and control purpose | 18.1.0 |
| 2022-09 | SA#97e | SP-220859 | 0767 | 1 | A | Update EASDF IOC | 18.1.0 |
| 2022-09 | SA#97e | SP-220849 | 0770 | - | F | YANG Corrections | 18.1.0 |
| 2022-09 | SA#97e | SP-220849 | 0772 | - | A | Add missing attributes n6Protection and nssaaSupport defined in CNSliceSubnetProfile to TopSliceSubnetProfile | 18.1.0 |
| 2022-09 | SA#97e | SP-220849 | 0774 | - | A | fix TaiList issues in stage 3 in TS28541\_5gcNrm.yaml | 18.1.0 |
| 2022-09 | SA#97e | SP-220849 | 0784 | - | A | Correction to coverageAreaTAList | 18.1.0 |
| 2022-09 | SA#97e |  |  |  |  | Removing duplicated content due to CRs including duplicated changes (MCC). | 18.1.1 |
| 2022-09 | SA#97e |  |  |  |  | Aligning OpenAPI code from FORGE | 18.1.2 |
| 2023-01 | SA#98e | SP-221188 | 0753 | 3 | C | Add Enhanced QoS support in NRM (stage 2) | 18.2.0 |
| 2023-01 | SA#98e | SP-221188 | 0754 | 3 | C | Add Enhanced QoS support in NRM (stage 3, YANG) | 18.2.0 |
| 2023-01 | SA#98e | SP-221172 | 0785 | - | F | YANG Corrections in Word TS | 18.2.0 |
| 2023-01 | SA#98e | SP-221188 | 0787 | - | B | NRM enhancements for AUSFFunction | 18.2.0 |
| 2023-01 | SA#98e | SP-221188 | 0788 | 1 | B | NRM enhancements for NEFFunction | 18.2.0 |
| 2023-01 | SA#98e | SP-221188 | 0789 | - | B | NRM enhancements for NSACFFunction | 18.2.0 |
| 2023-01 | SA#98e | SP-221188 | 0790 | 1 | B | NRM enhancements for NWDAFFunction | 18.2.0 |
| 2023-01 | SA#98e | SP-221188 | 0791 | 1 | B | NRM enhancements for SCPFunction | 18.2.0 |
| 2023-01 | SA#98e | SP-221188 | 0792 | 1 | B | NRM enhancements for SEPPFunction | 18.2.0 |
| 2023-01 | SA#98e | SP-221188 | 0793 | - | B | NRM enhancements for UDSFFunction | 18.2.0 |
| 2023-01 | SA#98e | SP-221169 | 0796 | - | A | Correcting name of nSInstanceId | 18.2.0 |
| 2023-01 | SA#98e | SP-221167 | 0803 | 2 | A | Correction to multiplicity of relation between NetworkSlice IOC and NetworkSliceSubnet IOC | 18.2.0 |
| 2023-01 | SA#98e | SP-221169 | 0806 | - | A | Correction to GSMA NG 116 reference for KPIMonitoring | 18.2.0 |
| 2023-01 | SA#98e | SP-221169 | 0809 | - | A | Correction to ServiceProfile attribute v2XCommModels name in YAML defintion | 18.2.0 |
| 2023-01 | SA#98e | SP-221169 | 0812 | - | A | Correction to inconsistencies in GNBCUCPFunction definition | 18.2.0 |
| 2023-01 | SA#98e | SP-221173 | 0816 | 1 | A | Adding YANG begin and End markers | 18.2.0 |
| 2023-01 | SA#98e | SP-221167 | 0820 | 1 | A | Address Editor's Note for the description of FeasibilityCheckAndReservationJob (6.3.9) | 18.2.0 |
| 2023-01 | SA#98e | SP-221180 | 0822 | - | A | Correct the definition for cellLocalId to support MOCN network sharing sceanrio (6.3.11) | 18.2.0 |
| 2023-01 | SA#98e | SP-221188 | 0823 | 1 | B | Update NWDAFFunction IOC to support management and control purpose | 18.2.0 |
| 2023-01 | SA#98e | SP-221181 | 0825 | - | A | Correct the misalignment information between stage2 and stage3 | 18.2.0 |
| 2023-01 | SA#98e | SP-221167 | 0828 | - | A | Replacing Support Qualifier with S | 18.2.0 |
| 2023-01 | SA#98e | SP-221182 | 0834 | - | A | Consistency in use of servAttrCom | 18.2.0 |
| 2023-01 | SA#98e | SP-221182 | 0837 | 1 | A | Correct kPIList | 18.2.0 |
| 2023-01 | SA#98e | SP-221182 | 0840 | 2 | A | Correct periodicityList | 18.2.0 |
| 2023-01 | SA#98e | SP-221167 | 0843 | 1 | A | Correct network slice state management table | 18.2.0 |
| 2023-01 | SA#98e |  |  |  |  | Fixing some implementation errors | 18.2.1 |
| 2023-02 |  |  |  |  |  | Removing revision marks | 18.2.2 |
| 2023-03 | SA#99 | SP-230196 | 0855 | - | A | Fix missing reference to mid-haul interface for EP Transport | 18.3.0 |
| 2023-03 | SA#99 | SP-230196 | 0857 | - | A | Fix duplicated SST attribute in RANSliceSubnetProfile | 18.3.0 |
| 2023-03 | SA#99 | SP-230206 | 0859 | 1 | B | NRM enhancements for SMSFFunction | 18.3.0 |
| 2023-03 | SA#99 | SP-230206 | 0860 | 1 | B | NRM enhancements for NRFFunction | 18.3.0 |
| 2023-03 | SA#99 | SP-230206 | 0861 | 1 | B | NRM enhancements for LMFFunction | 18.3.0 |
| 2023-03 | SA#99 | SP-230206 | 0862 | 1 | B | NRM enhancements for AFFunction | 18.3.0 |
| 2023-03 | SA#99 | SP-230206 | 0863 | - | B | NRM enhancements for EASDFFunction | 18.3.0 |
| 2023-03 | SA#99 | SP-230206 | 0864 | 1 | B | NRM enhancements for NSSAAFFunction | 18.3.0 |
| 2023-03 | SA#99 | SP-230199 | 0867 | 1 | A | Remove redundant stage 3 definition for Mnc and PlmnId | 18.3.0 |
| 2023-03 | SA#99 | SP-230196 | 0870 | 1 | A | Fix IpAddr definition and references | 18.3.0 |
| 2023-03 | SA#99 | SP-230207 | 0872 | - | A | ManagedNFProfile stage3 not consistent with Stage 2 | 18.3.0 |
| 2023-03 | SA#99 | SP-230207 | 0874 | 1 | A | Correct issues for feasibility check and resource reservation NRM fragment | 18.3.0 |
| 2023-03 | SA#99 | SP-230206 | 0875 | 1 | B | Add Enhanced QoS support in NRM (stage 3, YAML) | 18.3.0 |
| 2023-03 | SA#99 | SP-230206 | 0876 | 1 | F | Update NRM fragment for 5QI configuration for NG-RAN | 18.3.0 |
| 2023-03 | SA#99 | SP-230206 | 0877 | 1 | F | Correct the description and definition for NWDAFFunction IOC | 18.3.0 |
| 2023-03 | SA#99 | SP-230200 | 0881 | 1 | A | Clarify Monut information clauses | 18.3.0 |
| 2023-03 | SA#99 | SP-230206 | 0882 | - | F | Correct the RRMPolicyRatio Description | 18.3.0 |
| 2023-03 | SA#99 | SP-230206 | 0888 | 1 | C | Add Annex recommending QoS model usage | 18.3.0 |
| 2023-03 | SA#99 | SP-230196 | 0890 | 2 | A | fixing coverageArea | 18.3.0 |
| 2023-03 | SA#99 | SP-230208 | 0891 | - | F | YANG Corrections | 18.3.0 |
| 2023-04 | SA#99 |  |  |  |  | Editorial corrections in H.5.12 | 18.3.1 |
| 2023-06 | SA#100 | SP-230653 | 0800 | 5 | B | Add NetworkSliceController and NetworkSliceSubnetController IOCs to support asynchronous LCM operations | 18.4.0 |
| 2023-06 | SA#100 | SP-230657 | 0894 | 1 | B | NRM enhancements for NRFFunction | 18.4.0 |
| 2023-06 | SA#100 | SP-230657 | 0895 | 1 | B | NRM enhancements for CHFFunction | 18.4.0 |
| 2023-06 | SA#100 | SP-230657 | 0896 | 1 | B | NRM enhancements for MFAFFunction | 18.4.0 |
| 2023-06 | SA#100 | SP-230657 | 0897 | - | B | NRM enhancements for DCCFFunction | 18.4.0 |
| 2023-06 | SA#100 | SP-230657 | 0898 | - | B | NRM enhancements for class diagram | 18.4.0 |
| 2023-06 | SA#100 | SP-230649 | 0900 | - | A | Correction to dCHOControl by adding definition to attribute properties table | 18.4.0 |
| 2023-06 | SA#100 | SP-230681 | 0903 | 1 | A | Correction to multiplicity definition to nRPciList and stage 3 implementation of both NRPciList and CSonPciList | 18.4.0 |
| 2023-06 | SA#100 | SP-230657 | 0904 | - | F | Corrections to missing properties for a few attributes | 18.4.0 |
| 2023-06 | SA#100 | SP-230657 | 0905 | 1 | C | Improve EP Transport model to clarify connection point info | 18.4.0 |
| 2023-06 | SA#100 | SP-230648 | 0908 | 1 | A | clean up of incorrect use of multiplicity isOrdered isUnique and isNullable in attribute properties table | 18.4.0 |
| 2023-06 | SA#100 | SP-230658 | 0910 | 1 | A | Correct the feasibility check and resource reservation NRM fragment | 18.4.0 |
| 2023-06 | SA#100 | SP-230658 | 0912 | - | A | Correct issues for NR NRM | 18.4.0 |
| 2023-06 | SA#100 | SP-230658 | 0914 | - | A | Update SliceNRM YAML to align with stage2 | 18.4.0 |
| 2023-06 | SA#100 | SP-230651 | 0916 | - | F | YANG Corrections | 18.4.0 |
| 2023-06 | SA#100 | SP-230657 | 0921 | - | F | Update NRM enhancements for NWDAFFunction | 18.4.0 |
| 2023-06 | SA#100 | SP-230658 | 0927 | 1 | A | Fixing coverageArea | 18.4.0 |
| 2023-06 | SA#100 | SP-230651 | 0931 | 1 | F | Several editorial Corrections | 18.4.0 |