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 "type5g3gpp";

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

organization "3GPP SA5";

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

description "The model defines common types for 5G networks and

network slicing.";

reference "3GPP TS 28.541";

revision 2021-08-04 { reference S5-214052/CR-0517; }

revision 2020-11-05 { reference CR-0411 ; }

revision 2019-10-20 { reference "Initial version."; }

grouping SNssai {

description

"Single Network Slice Selection Assistance Information(S-NSSAI)";

reference "3GPP TS 23.003";

leaf sd {

description "Slice Differentiator

If not needed, the value can be set to FFFFFF.";

type string{

length 6;

pattern '[a-fA-F0-9]\*';

}

reference "3GPP TS 23.003";

}

leaf sst {

type uint8;

description "Slice/Service Type.

Values 0 to 127 belong to standardized SST range and are defined in

3GPP TS 23.501. Values 128 to 255 belong to operator-specific range.";

}

}

grouping PLMNInfo {

description "The PLMNInfo data type define a S-NSSAI member in a specific

PLMNId, and it have two attributes PLMNId and S-NSSAI (PLMNId, S-NSSAI).

The PLMNId represents a data type that is comprised of mcc

(mobile country code) and mnc (mobile network code), (See TS 23.003

subclause 2.2 and 12.1) and S-NSSAI represents an data type, that is

comprised of an SST (Slice/Service type) and an optional

SD (Slice Differentiator) field";

uses types3gpp:PLMNId;

uses SNssai;

}

typedef CommModelType {

reference "3GPP TS 23501";

type enumeration {

enum DIRECT\_COMMUNICATION\_WO\_NRF {

value 0;

description "Directly communicate to other pre-configured NF service.";

}

enum DIRECT\_COMMUNICATION\_WITH\_NRF {

value 1;

description "Directly communicate to other NF service discovered

by NRF.";

}

enum INDIRECT\_COMMUNICATION\_WO\_DEDICATED\_DISCOVERY {

value 2;

description "Communicate to pre-configured other NF service through

SCP as a proxy.";

}

enum INDIRECT\_COMMUNICATION\_WITH\_DEDICATED\_DISCOVERY {

value 3;

description "Communication to NF service discovered by NRF through SCP

as a proxy.";

}

}

}

grouping CommModel {

leaf groupId {

type uint16;

}

leaf commModelType {

type CommModelType;

}

leaf-list targetNFServiceList {

type types3gpp:DistinguishedName;

}

leaf commModelConfiguration {

type string;

}

}

grouping SupportedFunc {

leaf function {

type string;

}

leaf policy {

type string;

}

}

typedef EnergySavingLoadThresholdT {

type uint32 {

range 0..10000;

}

units 1/10000;

}

typedef EnergySavingTimeDurationT {

type uint32 {

range 0..900;

}

units seconds;

}

typedef PhysCellID {

type uint32 {

range "0..1007";

}

reference "clause 7.4.2 of TS 38.211";

}

typedef UTC24TimeOfDayT {

description "Time of day in HH:MM or H:MM 24-hour format per UTC

time zone.";

type string {

pattern "(([01]?[0-9])|(2[0-3])):([0-5][0-9])";

}

}

typedef DayOfWeekT {

type enumeration {

enum Monday;

enum Tuesday;

enum Wednesday;

enum Thursday;

enum Friday;

enum Saturday;

enum Sunday;

}

}

}

<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";

description "This IOC is defined only to describe the IOCs representing

its interaction interface with 5GC (i.e. EP\_Rx and EP\_N5).

It has no attributes defined.";

reference "3GPP TS 28.541";

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

revision 2019-05-15 {

description "initial revision";

}

grouping AFFunctionGrp {

uses mf3gpp:ManagedFunctionGrp;

}

augment "/me3gpp:ManagedElement" {

list AFFunction {

description "5G Core AF Function";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses AFFunctionGrp;

}

}

}

}

<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.";

revision 2020-11-05 { reference CR-0411 ; }

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.";

revision 2020-11-05 { reference CR-0411 ; }

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

revision 2019-06-11 { reference "Ericsson refactoring."; }

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.";

revision 2020-11-05 { reference CR-0411 ; }

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 2020-11-05 { reference CR-0411 ; }

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";

}

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 2019-06-17 {

description "initial revision";

}

grouping NFProfileGrp {

leaf nfInstanceID {

description "String uniquely identifying a NF instance.";

mandatory true;

type string;

}

leaf nfType {

description "Type of Network Function.";

mandatory true;

type types3gpp:NfType;

}

leaf nfStatus {

description "Status of the NF Instance.";

mandatory true;

type NFStatus;

}

leaf heartBeatTimer {

description "Time in seconds expected between 2 consecutive heart-beat messages from

an NF Instance to the NRF. It may be included in the registration request.

When present in the request it shall contain the heartbeat time proposed by the NF service consumer.";

//conditional support

type uint16;

}

list plmnList {

description "PLMN(s) of the Network Function.

This IE shall be present if this information is available for the NF.

If not provided, PLMN ID(s) of the PLMN of the NRF are assumed for the NF.";

//conditional support

min-elements 1;

key "mcc mnc";

uses types3gpp:PLMNId;

}

list sNssais { //is the key unique

description "S-NSSAIs of the Network Function. If not provided, the NF can serve any S-NSSAI.

When present this IE represents the list of S-NSSAIs supported in all the PLMNs listed in the plmnList IE.";

min-elements 1;

//optional support

key "sst sd";

uses Snssai;

}

list perPlmnSnssaiList {

description "This IE may be included when the list of S-NSSAIs supported by the NF for each PLMN it is supporting is different.

When present, this IE shall include the S-NSSAIs supported by the Network Function

for each PLMN supported by the Network Function. When present, this IE shall override sNssais IE.";

min-elements 1;

//optional support

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

uses PlmnSnssai;

}

leaf-list nsiList {

description "NSI identities of the Network Function.

If not provided, the NF can serve any NSI.";

//optional support

min-elements 1;

type string;

}

leaf fqdn {

description "FQDN of the Network Function. For AMF, the FQDN registered with the NRF

shall be that of the AMF Name.";

//conditional support

type inet:domain-name;

}

leaf interPlmnFqdn {

description "If the NF needs to be discoverable by other NFs in a different PLMN,

then an FQDN that is used for inter-PLMN routing is specified.";

//conditional support

type inet:domain-name;

}

leaf-list ipv4Addresses {

description "IPv4 address(es) of the Network Function.";

min-elements 1;

//conditional support

type inet:ipv4-address;

}

leaf-list ipv6Addresses {

description "IPv6 address(es) of the Network Function.";

min-elements 1;

//conditional support

type inet:ipv6-address;

}

list allowedPlmns {

description "PLMNs allowed to access the NF instance.

If not provided, any PLMN is allowed to access the NF.";

min-elements 1;

//optional support

key "mcc mnc";

uses types3gpp:PLMNId;

}

leaf-list allowedNfTypes {

description "Type of the NFs allowed to access the NF instance.

If not provided, any NF type is allowed to access the NF.";

min-elements 1;

//optional support

type types3gpp:NfType;

}

leaf-list allowedNfDomains {

description "Pattern representing the NF domain names allowed to access the NF instance.

If not provided, any NF domain is allowed to access the NF.";

min-elements 1;

//optional support

type string;

}

list allowedNssais { //is the key unique

description "S-NSSAI of the allowed slices to access the NF instance.

If not provided, any slice is allowed to access the NF.";

min-elements 1;

//optional support

key "sst sd";

uses Snssai;

}

leaf priority {

description "Priority (relative to other NFs of the same type) in the range of 0-65535, to be used for NF selection;

lower values indicate a higher priority. If priority is also present in the nfServiceList parameters,

those will have precedence over this value. The NRF may overwrite the received priority value when exposing

an NFProfile with the Nnrf\_NFDiscovery service.";

//optional support

type uint16;

}

leaf capacity {

description "Static capacity information in the range of 0-65535, expressed as a weight

relative to other NF instances of the same type; if capacity is also present

in the nfServiceList parameters, those will have precedence over this value.";

//optional support

type uint16;

}

leaf load {

description "Dynamic load information, ranged from 0 to 100, indicates the current load percentage of the NF.";

//optional support

type types3gpp:Load;

}

leaf locality {

description "Operator defined information about the location of the NF instance (e.g. geographic location, data center).";

//optional support

type string;

}

grouping udrInfo {

//optional support

leaf groupId {

description "Identity of the UDR group that is served by the UDR instance.

If not provided, the UDR instance does not pertain to any UDR group.";

//optional support

type string;

}

list supiRanges {

description "List of ranges of SUPI's whose profile data is available in the UDR instance.";

key "start end pattern";

min-elements 1;

//optional support

uses SupiRange;

}

list gpsiRanges {

description "List of ranges of GPSIs whose profile data is available in the UDR instance.";

key "start end pattern";

min-elements 1;

//optional support

uses IdentityRange;

}

list externalGroupIdentifiersRanges {

description "List of ranges of external groups whose profile data is available in the UDR instance.";

key "start end pattern";

min-elements 1;

//optional support

uses IdentityRange;

}

leaf-list supportedDataSets {

description "List of supported data sets in the UDR instance.

If not provided, the UDR supports all data sets.";

min-elements 1;

//optional support

type DataSetId;

}

}

grouping udmInfo {

//optional support

leaf groupId {

description "Identity of the UDM group that is served by the UDM instance.

If not provided, the UDM instance does not pertain to any UDM group.";

//optional support

type string;

}

list supiRanges {

description "List of ranges of SUPI's whose profile data is available in the UDM instance.";

key "start end pattern";

min-elements 1;

//optional support

uses SupiRange;

}

list gpsiRanges {

description "List of ranges of GPSIs whose profile data is available in the UDM instance.";

key "start end pattern";

min-elements 1;

//optional support

uses IdentityRange;

}

list externalGroupIdentifiersRanges {

description "List of ranges of external groups whose profile data is available in the UDM instance.";

key "start end pattern";

min-elements 1;

//optional support

uses IdentityRange;

}

leaf-list routingIndicators {

description "List of Routing Indicator information that allows to route network signalling with SUCI

to the UDM instance. If not provided, the UDM can serve any Routing Indicator.

Pattern: '^[0-9]{1,4}$'.";

//optional support

min-elements 1;

type string;

}

}

grouping ausfInfo {

//optional support

leaf groupId {

description "Identity of the AUSF group. If not provided, the AUSF instance does not pertain to any AUSF group.";

//optional support

type string;

}

list supiRanges {

description "List of ranges of SUPIs that can be served by the AUSF instance. If not provided, the AUSF can serve any SUPI.";

key "start end pattern";

min-elements 1;

//optional support

uses SupiRange;

}

leaf-list routingIndicators {

description "List of Routing Indicator information that allows to route network signalling with SUCI

to the AUSF instance. If not provided, the AUSF can serve any Routing Indicator.

Pattern: '^[0-9]{1,4}$'.";

//optional support

min-elements 1;

type string;

}

}

grouping amfInfo {

//optional support

leaf amfRegionId {

description "AMF region identifier";

type string;

}

leaf amfSetId {

description "AMF set identifier";

type string;

}

list guamiList {

description "List of supported GUAMIs.";

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

min-elements 1;

uses Guami;

}

list taiList {

description "The list of TAIs the AMF can serve. It may contain the non-3GPP access TAI.

The absence of this attribute and the taiRangeList attribute indicate that

the AMF can be selected for any TAI in the serving network.";

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

//optional support

min-elements 1;

uses Tai;

}

list taiRangeList {

description "The range of TAIs the AMF can serve. The absence of this attribute and the taiList

attribute indicate that the AMF can be selected for any TAI in the serving network.";

//optional support

min-elements 1;

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

uses TaiRange;

}

list backupInfoAmfFailure {

description "List of GUAMIs for which the AMF acts as a backup for AMF failure.";

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

//optional support

min-elements 1;

uses Guami;

}

list backupInfoAmfRemoval {

description "List of GUAMIs for which the AMF acts as a backup for planned AMF removal.";

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

//optional support

min-elements 1;

uses Guami;

}

list n2InterfaceAmfInfo {

description "N2 interface information of the AMF. This information needs not be sent in NF Discovery responses.

It may be used by the NRF to update the DNS for AMF discovery by the 5G Access Network.";

//optional support

max-elements 1;

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

uses N2InterfaceAmfInfo;

}

}

grouping smfInfo {

//optional support

list sNssaiSmfInfoList {

description "List of parameters supported by the SMF per S-NSSAI.";

min-elements 1;

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

uses sNssaiSmfInfoItem;

}

list taiList {

description "The list of TAIs the SMF can serve. It may contain the non-3GPP access TAI.

The absence of this attribute and the taiRangeList attribute indicate that

the SMF can be selected for any TAI in the serving network.";

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

//optional support

min-elements 1;

uses Tai;

}

list taiRangeList {

description "The range of TAIs the SMF can serve. The absence of this attribute and the taiList

attribute indicate that the SMF can be selected for any TAI in the serving network.";

//optional support

min-elements 1;

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

uses TaiRange;

}

leaf pgwFqdn {

description "The FQDN of the PGW if the SMF is a combined SMF/PGW-C.";

//optional support

type inet:domain-name;

}

leaf-list accessType {

description "If included, this IE shall contain the access type (3GPP\_ACCESS and/or NON\_3GPP\_ACCESS) supported by the SMF.

If not included, it shall be assumed the both access types are supported.";

//conditional support

min-elements 1;

max-elements 2;

type AccessType;

}

}

grouping upfInfo {

//optional support

list sNssaiUpfInfoList {

description "List of parameters supported by the UPF per S-NSSAI.";

min-elements 1;

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

uses SnssaiUpfInfoItem;

}

leaf-list smfServingArea {

description "The SMF service area(s) the UPF can serve.

If not provided, the UPF can serve any SMF service area.";

//optional support

min-elements 1;

type string;

}

list interfaceUpfInfo {

description "List of User Plane interfaces configured on the UPF. When this IE is provided in the NF Discovery response,

the NF Service Consumer (e.g. SMF) may use this information for UPF selection.";

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

//optional support

min-elements 1;

uses InterfaceUpfInfoItem;

}

leaf iwkEpsInd {

description "Indicates whether interworking with EPS is supported by the UPF.

true: Supported

false (default): Not Supported";

//optional support

type boolean;

}

leaf-list pduSessionTypes {

description "List of PDU session type(s) supported by the UPF. The absence of this attribute indicates that the UPF can be selected

for any PDU session type.";

//optional support

min-elements 1;

type PduSessionType;

}

}

grouping pcfInfo {

//optional support

leaf-list dnnList {

description "DNNs supported by the PCF.

If not provided, the PCF can serve any DNN.";

//optional support

min-elements 1;

type string;

}

list supiRanges {

description "List of ranges of SUPIs that can be served by the PCF instance. If not provided, the PCF can serve any SUPI.";

key "start end pattern";

min-elements 1;

//optional support

uses SupiRange;

}

leaf rxDiamHost {

description "This IE shall be present if the PCF supports Rx interface.

When present, this IE shall indicate the Diameter host of the Rx interface for the PCF.

Pattern: '^([A-Za-z0-9]+(-[A-Za-z0-9]+).)+[a-z]{2,}$'.";

//conditional support

type string;

}

leaf rxDiamRealm {

description "This IE shall be present if the PCF supports Rx interface.

When present, this IE shall indicate the Diameter realm of the Rx interface for the PCF.

Pattern: '^([A-Za-z0-9]+(-[A-Za-z0-9]+).)+[a-z]{2,}$'.";

//conditional support

type string;

}

}

grouping bsfInfo {

//optional support

list ipv4AddressRanges {

description "List of ranges of IPv4 addresses handled by BSF.

If not provided, the BSF can serve any IPv4 address.";

//optional support

key "start end";

uses types3gpp:Ipv4AddressRange;

}

leaf-list dnnList {

description "List of DNNs handled by the BSF

If not provided, the BSF can serve any DNN.";

//optional support

min-elements 1;

type string;

}

leaf-list ipDomainList {

description "List of IPv4 address domains, as described in subclause 6.2 of 3GPP TS 29.513, handled by the BSF.

If not provided, the BSF can serve any IP domain.";

//optional support

min-elements 1;

type string;

}

list ipv6PrefixRanges {

description "List of ranges of IPv6 prefixes handled by the BSF.

If not provided, the BSF can serve any IPv6 prefix.";

//optional support

key "start end";

uses types3gpp:Ipv6PrefixRange;

}

}

grouping chfInfo {

//optional support

list supiRangeList {

description "List of ranges of SUPIs that can be served by the CHF instance. If not provided, the CHF can serve any SUPI.";

key "start end pattern";

min-elements 1;

//optional support

uses SupiRange;

}

list gpsiRangeList {

description "List of ranges of GPSI that can be served by the CHF instance. If not provided, the CHF can serve any GPSI.";

key "start end pattern";

min-elements 1;

//optional support

uses IdentityRange;

}

list plmnRangeList {

description "List of ranges of PLMNs (including the PLMN IDs of the CHF instance) that can be served by the CHF instance.

If not provided, the CHF can serve any PLMN.";

min-elements 1;

//optional support

key "mcc mnc";

uses types3gpp:PLMNId;

}

}

grouping nrfInfoGrp {

//optional support

list servedUdrInfo {

description "This attribute contains all the udrInfo attributes locally configured in the NRF or the NRF received during NF registration.";

//optional support

key nfInstanceID;

leaf nfInstanceID {

description "String uniquely identifying a NF instance.";

type string;

}

min-elements 1;

uses udrInfo;

}

list servedUdmInfo {

description "This attribute contains all the udmInfo attributes locally configured in the NRF or the NRF received during NF registration.";

//optional support

key nfInstanceID;

leaf nfInstanceID {

description "String uniquely identifying a NF instance.";

type string;

}

min-elements 1;

uses udmInfo;

}

list servedAusfInfo {

description "This attribute contains all the ausfInfo attributes locally configured in the NRF or the NRF received during NF registration.";

//optional support

key nfInstanceID;

leaf nfInstanceID {

description "String uniquely identifying a NF instance.";

type string;

}

min-elements 1;

uses ausfInfo;

}

list servedAmfInfo {

description "This attribute contains all the amfInfo attributes locally configured in the NRF or the NRF received during NF registration.";

//optional support

key nfInstanceID;

leaf nfInstanceID {

description "String uniquely identifying a NF instance.";

type string;

}

min-elements 1;

uses amfInfo;

}

list servedSmfInfo {

description "This attribute contains all the smfInfo attributes locally configured in the NRF or the NRF received during NF registration.";

//optional support

key nfInstanceID;

leaf nfInstanceID {

description "String uniquely identifying a NF instance.";

type string;

}

min-elements 1;

uses smfInfo;

}

list servedUpfInfo {

description "This attribute contains all the upfInfo attributes locally configured in the NRF or the NRF received during NF registration.";

//optional support

key nfInstanceID;

leaf nfInstanceID {

description "String uniquely identifying a NF instance.";

type string;

}

min-elements 1;

uses upfInfo;

}

list servedPcfInfo {

description "This attribute contains all the pcfInfo attributes locally configured in the NRF or the NRF received during NF registration.";

//optional support

key nfInstanceID;

leaf nfInstanceID {

description "String uniquely identifying a NF instance.";

type string;

}

min-elements 1;

uses pcfInfo;

}

list servedBsfInfo {

description "This attribute contains all the bsfInfo attributes locally configured in the NRF or the NRF received during NF registration.";

//optional support

key nfInstanceID;

leaf nfInstanceID {

description "String uniquely identifying a NF instance.";

type string;

}

min-elements 1;

uses bsfInfo;

}

list servedChfInfo {

description "This attribute contains all the bsfInfo attributes locally configured in the NRF or the NRF received during NF registration.";

//optional support

key nfInstanceID;

leaf nfInstanceID {

description "String uniquely identifying a NF instance.";

type string;

}

min-elements 1;

uses chfInfo;

}

}

list nrfInfo {

key idx; //no obvious leaf to use as a key

leaf idx { type uint32; }

max-elements 1;

uses nrfInfoGrp;

}

leaf customInfo {

description "Specific data for custom Network Functions.";

type string;

}

leaf recoveryTime {

description "Timestamp when the NF was (re)started.";

//optional support

type yang:date-and-time;

}

leaf nfServicePersistence {

description "If present, and set to true, it indicates that the different service instances of a same NF Service in this NF instance,

supporting a same API version, are capable to persist their resource state in shared storage and therefore these resources

are available after a new NF service instance supporting the same API version is selected by a NF Service Consumer (see 3GPP TS 23.527).

Otherwise, it indicates that the NF Service Instances of a same NF Service are not capable to share resource state inside the NF Instance.";

//optional support

type boolean;

}

list nfServices {

description "List of NF Service Instances. It shall include the services produced by the NF that can be discovered by other NFs.";

key serviceInstanceID;

//optional support

min-elements 1;

uses nfs3gpp:NFServiceGrp;

}

leaf nfProfileChangesSupportInd {

description "NF Profile Changes Support Indicator. This IE may be present in the NFRegister or NFUpdate (NF Profile Complete Replacement) request and shall be absent in the response.

true: the NF Service Consumer supports receiving NF Profile Changes in the response.

false (default): the NF Service Consumer does not support receiving NF Profile Changes in the response.";

//optional support

type boolean;

}

leaf nfProfileChangesInd {

description "NF Profile Changes Indicator. This IE shall be absent in the request to the NRF and may be included by the NRF in NFRegister or NFUpdate (NF Profile Complete Replacement) response.

true: the NF Profile contains NF Profile changes.

false (default): complete NF Profile.";

//optional support

type boolean;

}

list defaultNotificationSubscriptions {

description "Notification endpoints for different notification types.";

key notificationType;

//optional support

min-elements 1;

uses types3gpp:DefaultNotificationSubscription;

}

}

typedef NFStatus {

type enumeration {

enum REGISTERED;

enum SUSPENDED;

}

}

typedef DataSetId {

type enumeration {

enum SUBSCRIPTION;

enum POLICY;

enum EXPOSURE;

enum APPLICATION;

}

}

grouping SupiRange {

leaf start {

description "First value identifying the start of a SUPI range. To be used when the range of SUPI's can be represented as a numeric range (e.g., IMSI ranges).";

type string {

pattern '^[0-9]+$';

}

}

leaf end {

description "Last value identifying the end of a SUPI range. To be used when the range of SUPI's can be represented as a numeric range (e.g. IMSI ranges).";

type string {

pattern '^[0-9]+$';

}

}

leaf pattern {

description "Pattern representing the set of SUPI's belonging to this range.

A SUPI value is considered part of the range if and only if the SUPI string fully matches the regular expression.";

type string;

}

}

grouping IdentityRange {

leaf start {

description "First value identifying the start of an identity range. To be used when the range of identities can be represented as a numeric range (e.g., MSISDN ranges).";

type string {

pattern '^[0-9]+$';

}

}

leaf end {

description "Last value identifying the end of an identity range. To be used when the range of identities can be represented as a numeric range (e.g. MSISDN ranges).";

type string {

pattern '^[0-9]+$';

}

}

leaf pattern {

description "Pattern representing the set of identities belonging to this range.

An identity value is considered part of the range if and only if the identity string fully matches the regular expression.";

type string;

}

}

grouping TacRange {

leaf start {

description "First value identifying the start of a TAC range, to be used when the range of TAC's can be represented as a hexadecimal range (e.g., TAC ranges).";

type string {

pattern '^([A-Fa-f0-9]{4}|[A-Fa-f0-9]{6}$)';

}

}

leaf end {

description "Last value identifying the end of a TAC range, to be used when the range of TAC's can be represented as a hexadecimal range (e.g. TAC ranges).";

type string {

pattern '^([A-Fa-f0-9]{4}|[A-Fa-f0-9]{6})$';

}

}

leaf pattern {

description "Pattern representing the set of TAC's belonging to this range.";

type string;

}

}

grouping SnssaiUpfInfoItem {

list sNssai { //is the key unique

description "Supported S-NSSAI.";

min-elements 1;

max-elements 1;

key "sst sd";

uses Snssai;

}

list dnnUpfInfoList {

description "List of parameters supported by the UPF per DNN.";

min-elements 1;

key dnn;

uses DnnUpfInfoItem;

}

}

grouping DnnUpfInfoItem {

leaf dnn {

description "String representing a Data Network.";

mandatory true;

type string;

}

leaf-list dnaiList {

description "List of Data network access identifiers supported by the UPF for this DNN.

The absence of this attribute indicates that the UPF can be selected for this DNN for any DNAI.";

min-elements 1;

type string; //dnai is the type but its only a string with desc: DNAI (Data network access identifier), is this needed as its own typedef or string is ok

}

leaf-list pduSessionTypes {

description "List of PDU session type(s) supported by the UPF for a specific DNN.";

min-elements 1;

type PduSessionType;

}

}

grouping Snssai {

leaf sst {

description "Unsigned integer, within the range 0 to 255, representing the Slice/Service Type.

It indicates the expected Network Slice behaviour in terms of features and services.";

mandatory true;

type uint32;

}

leaf sd {

description "3-octet string, representing the Slice Differentiator, in hexadecimal representation.";

//optional

type string {

pattern '^[A-Fa-f0-9]{6}$';

}

}

reference "3GPP TS 29.571";

}

typedef PduSessionType {

type enumeration {

enum IPV4;

enum IPV6;

enum IPV4V6;

enum UNSTRUCTURED;

enum ETHERNET;

}

}

grouping Guami {

list plmnId {

description "PLMN Identity.";

min-elements 1;

max-elements 1;

key "mcc mnc";

uses types3gpp:PLMNId;

}

list amfId {

description "AMF Identity.";

min-elements 1;

max-elements 1;

key "amfRegionId amfSetId amfPointer";

uses types3gpp:AmfIdentifier;

}

}

grouping Tai {

list plmnId {

description "PLMN Identity.";

min-elements 1;

max-elements 1;

key "mcc mnc";

uses types3gpp:PLMNId;

}

leaf tac { type types3gpp:Tac; }

}

grouping InterfaceUpfInfoItem {

leaf interfaceType {

description "User Plane interface type.";

mandatory true;

type UPInterfaceType;

}

////At least one of the addressing parameters (ipv4address, ipv6adress or endpointFqdn) shall be included in the InterfaceUpfInfoItem.

choice address {

case ipv4EndpointAddresses {

leaf-list ipv4EndpointAddresses {

description "Available endpoint IPv4 address(es) of the User Plane interface.";

//conditional support

min-elements 1;

type inet:ipv4-address;

}

}

case ipv6EndpointAddresses {

leaf-list ipv6EndpointAddresses {

description "Available endpoint IPv6 address(es) of the User Plane interface.";

//conditional support

min-elements 1;

type inet:ipv6-address;

}

}

case endpointFqdn {

leaf endpointFqdn {

description "FQDN of available endpoint of the User Plane interface.";

//conditional support

type inet:domain-name;

}

}

}

leaf networkInstance {

description "Network Instance associated to the User Plane interface.";

//optional support

type string;

}

}

typedef UPInterfaceType {

type enumeration {

enum N3;

enum N6;

enum N9;

}

}

grouping TaiRange {

list plmnId {

description "PLMN ID related to the TacRange.";

min-elements 1;

max-elements 1;

key "mcc mnc";

uses types3gpp:PLMNId;

}

list tacRangeList { //is this key unique

description "The range of the TACs.";

min-elements 1;

key "start end";

uses TacRange;

}

}

typedef AccessType {

type enumeration {

enum 3GPP\_ACCESS;

enum NON\_3GPP\_ACCESS;

}

}

grouping N2InterfaceAmfInfo {

//At least one of the addressing parameters (ipv4address or ipv6adress) shall be included.

choice address {

case ipv4EndpointAddress {

leaf-list ipv4EndpointAddress {

description "Available AMF endpoint IPv4 address(es) for N2.";

//conditional support

min-elements 1;

type inet:ipv4-address;

}

}

case ipv6EndpointAddress {

leaf-list ipv6EndpointAddress {

description "Available AMF endpoint IPv6 address(es) for N2.";

//conditional support

min-elements 1;

type inet:ipv6-address;

}

}

}

leaf amfName {

description "AMF name.";

type string;

}

}

grouping sNssaiSmfInfoItem {

list sNssai { //is the key unique

description "Supported S-NSSAI.";

min-elements 1;

max-elements 1;

key "sst sd";

uses Snssai;

}

list dnnSmfInfoList { //is the key unique

description "List of parameters supported by the SMF per DNN.";

min-elements 1;

key dnn;

uses DnnSmfInfoItem;

}

}

grouping DnnSmfInfoItem {

leaf dnn {

description "Supported DNN.";

mandatory true;

type string;

}

}

grouping PlmnSnssai {

list plmnId {

description "PLMN ID for which list of supported S-NSSAI(s) is provided.";

min-elements 1;

max-elements 1;

key "mcc mnc";

uses types3gpp:PLMNId;

}

list sNssaiList { //is the key unique

description "The specific list of S-NSSAIs supported by the given PLMN.";

min-elements 1;

key "sst sd";

uses Snssai;

}

}

}

<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 2020-11-05 { reference CR-0411 ; }

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 2020-11-05 { reference CR-0411 ; }

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 2020-11-05 { reference CR-0411 ; }

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 2020-11-05 { reference CR-0411 ; }

revision 2020-08-03 { reference "CR-0321"; }

revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

revision 2019-05-15 { reference "initial revision"; }

grouping NSSFFunctionGrp {

description "Represents the NSSFFunction IOC";

uses mf3gpp:ManagedFunctionGrp;

list pLMNIdList {

description "List of at most six entries of PLMN Identifiers, but at least

one (the primary PLMN Id).

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

Mobile Network Code (MNC).";

min-elements 1;

max-elements 6;

key "mcc mnc";

uses types3gpp:PLMNId;

}

leaf sBIFQDN {

description "The FQDN of the registered NF instance in the service-based

interface.";

type inet:domain-name;

}

list sNSSAIList {

description "List of S-NSSAIs the managed object is capable of supporting.

(Single Network Slice Selection Assistance Information)

An S-NSSAI has an SST (Slice/Service type) and an optional SD

(Slice Differentiator) field.";

reference "3GPP TS 23.003";

key "sd sst";

uses types5g3gpp:SNssai;

}

leaf-list cNSIIdList {

description "NSI ID. NSI ID is an identifier for identifying the Core

Network part of a Network Slice instance when multiple Network Slice

instances of the same Network Slice are deployed, and there is a need

to differentiate between them in the 5GC, see clause 3.1 of TS 23.501

and subclause 6.1.6.2.7 of 3GPP TS 29.531";

type string;

}

list managedNFProfile {

key idx;

min-elements 1;

max-elements 1;

uses types3gpp:ManagedNFProfile;

}

}

augment "/me3gpp:ManagedElement" {

list NSSFFunction {

description "5G Core NSSF Function";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses NSSFFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<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 2020-11-05 { reference CR-0411 ; }

revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

revision 2019-05-15 {reference "initial revision"; }

grouping NWDAFFunctionGrp {

description "Represents the NWDAFFunction IOC";

uses mf3gpp:ManagedFunctionGrp;

list pLMNIdList {

description "List of at most six entries of PLMN Identifiers, but at

least one (the primary PLMN Id).

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

Mobile Network Code (MNC).";

min-elements 1;

max-elements 6;

key "mcc mnc";

uses types3gpp:PLMNId;

}

leaf sBIFQDN {

description "The FQDN of the registered NF instance in the service-based

interface.";

type inet:domain-name;

}

list sNSSAIList {

description "List of S-NSSAIs the managed object is capable of supporting.

(Single Network Slice Selection Assistance Information)

An S-NSSAI has an SST (Slice/Service type) and an optional SD

(Slice Differentiator) field.";

//optional support

reference "3GPP TS 23.003";

key "sd sst";

uses types5g3gpp:SNssai;

}

list managedNFProfile {

key idx;

min-elements 1;

max-elements 1;

uses types3gpp:ManagedNFProfile;

}

list commModelList {

min-elements 1;

key "groupId";

description "Specifies a list of commModel. It can be used by NF and

NF services to interact with each other in 5G Core network ";

reference "3GPP TS 23.501";

uses types5g3gpp:CommModel;

}

}

augment "/me3gpp:ManagedElement" {

list NWDAFFunction {

description "5G Core NWDAF Function";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses NWDAFFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<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 2020-11-05 { reference CR-0411 ; }

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";

description "This IOC represents the external SEPP function which support message filtering

and policing on inter-PLMN control plane interface. For more information about the SEPP, see 3GPP TS 23.501.";

reference "3GPP TS 28.541";

revision 2019-11-17 {

description "initial revision";

reference "Based on

3GPP TS 28.541";

}

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;

}

}

}

}

<CODE ENDS>

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

<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.";

revision 2020-11-05 { reference CR-0411 ; }

revision 2020-08-06 { reference "CR-0333"; }

revision 2020-06-03 { reference "CR-0286"; }

revision 2019-10-25 { reference "S5-194457 S5-193518"; }

revision 2019-05-31 {reference "Ericsson refactoring."; }

revision 2018-08-07 { reference "Initial revision";}

grouping SMFFunctionGrp {

description "Represents the SMFFuntion IOC";

uses mf3gpp:ManagedFunctionGrp;

list pLMNIdList {

min-elements 1;

description "A list of PLMN identifiers (Mobile Country Code and Mobile

Network Code).";

key "mcc mnc";

uses types3gpp:PLMNId;

}

leaf-list nRTACList {

description "List of Tracking Area Codes (legacy TAC or extended TAC)

where the represented management function is serving.";

reference "TS 38.413 clause 9.3.3.10";

min-elements 1;

config false;

type types3gpp:Tac;

}

leaf sBIFQDN {

description "The FQDN of the registered NF instance in the service-based

interface.";

type inet:domain-name;

}

list sNSSAIList {

description "List of S-NSSAIs the managed object is capable of supporting.

(Single Network Slice Selection Assistance Information)

An S-NSSAI has an SST (Slice/Service type) and an optional SD

(Slice Differentiator) field.";

reference "3GPP TS 23.003";

key "sd sst";

uses types5g3gpp:SNssai;

}

list managedNFProfile {

key idx;

min-elements 1;

max-elements 1;

uses types3gpp:ManagedNFProfile;

}

list commModelList {

min-elements 1;

key "groupId";

description "Specifies a list of commModel. It can be used by NF and

NF services to interact with each other in 5G Core network ";

reference "3GPP TS 23.501";

uses types5g3gpp:CommModel;

}

leaf configurable5QISetRef {

type types3gpp:DistinguishedName;

description "DN of the Configurable5QISet that the SMFFunction supports

(is associated to).";

}

leaf dynamic5QISetRef {

type types3gpp:DistinguishedName;

description "DN of the Dynamic5QISet that the SMFFunction supports

(is associated to).";

}

}

augment "/me3gpp:ManagedElement" {

list SMFFunction {

description "5G Core SMF Function";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses SMFFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<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 2020-11-05 { reference CR-0411 ; }

revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

revision 2019-05-22 { reference "initial revision";}

grouping UDMFuntionGrp {

description "Represents the UDMFuntion IOC";

uses mf3gpp:ManagedFunctionGrp;

list pLMNIdList {

description "List of at most six entries of PLMN Identifiers, but at

least one (the primary PLMN Id).

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

Mobile Network Code (MNC).";

min-elements 1;

max-elements 6;

key "mcc mnc";

uses types3gpp:PLMNId;

}

leaf sBIFQDN {

description "The FQDN of the registered NF instance in the service-based

interface.";

type inet:domain-name;

}

list sNSSAIList {

description "List of S-NSSAIs the managed object is capable of supporting.

(Single Network Slice Selection Assistance Information)

An S-NSSAI has an SST (Slice/Service type) and an optional SD

(Slice Differentiator) field.";

//optional support

reference "3GPP TS 23.003";

key "sd sst";

uses types5g3gpp:SNssai;

}

list managedNFProfile {

key idx;

min-elements 1;

max-elements 1;

uses types3gpp:ManagedNFProfile;

}

list commModelList {

min-elements 1;

key "groupId";

description "Specifies a list of commModel. It can be used by NF and

NF services to interact with each other in 5G Core network ";

reference "3GPP TS 23.501";

uses types5g3gpp:CommModel;

}

}

augment "/me3gpp:ManagedElement" {

list UDMFunction {

description "5G Core UDM Function";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses UDMFuntionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<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 2020-11-05 { reference CR-0411 ; }

revision 2019-10-25 { reference "S5-194457 S5-195427 S5-193518"; }

revision 2019-05-22 { reference "initial revision"; }

grouping UDRFuntionGrp {

description "Represents the UDRFuntion IOC";

uses mf3gpp:ManagedFunctionGrp;

list pLMNIdList {

description "List of at most six entries of PLMN Identifiers, but at

least one (the primary PLMN Id).

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

Mobile Network Code (MNC).";

min-elements 1;

max-elements 6;

key "mcc mnc";

uses types3gpp:PLMNId;

}

leaf sBIFQDN {

description "The FQDN of the registered NF instance in the service-based

interface.";

type inet:domain-name;

}

list sNSSAIList {

description "List of S-NSSAIs the managed object is capable of supporting.

(Single Network Slice Selection Assistance Information)

An S-NSSAI has an SST (Slice/Service type) and an optional SD

(Slice Differentiator) field.";

//optional support

reference "3GPP TS 23.003";

key "sd sst";

uses types5g3gpp:SNssai;

}

list managedNFProfile {

key idx;

min-elements 1;

max-elements 1;

uses types3gpp:ManagedNFProfile;

}

}

augment "/me3gpp:ManagedElement" {

list UDRFunction {

description "5G Core UDR Function";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses UDRFuntionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<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 2020-11-05 { reference CR-0411 ; }

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 2020-11-05 { reference CR-0411 ; }

revision 2019-10-25 { reference "S5-194457 S5-193518"; }

revision 2019-05-31 { reference "Ericsson refactoring."; }

revision 2018-08-07 { reference "Initial revision"; }

grouping UPFFunctionGrp {

description "Represents the UPFFunction IOC";

uses mf3gpp:ManagedFunctionGrp;

list pLMNIdList {

description "A list of PLMN identifiers (Mobile Country Code and Mobile

Network Code).";

min-elements 1;

key "mcc mnc";

uses types3gpp:PLMNId;

}

leaf-list nRTACList {

description "List of Tracking Area Codes (legacy TAC or extended TAC)

where the represented management function is serving.";

reference "TS 38.413 clause 9.3.3.10";

min-elements 1;

config false;

type types3gpp:Tac;

}

list sNSSAIList {

description "List of S-NSSAIs the managed object is capable of supporting.

(Single Network Slice Selection Assistance Information)

An S-NSSAI has an SST (Slice/Service type) and an optional SD

(Slice Differentiator) field.";

reference "3GPP TS 23.003";

key "sd sst";

uses types5g3gpp:SNssai;

}

list managedNFProfile {

key idx;

min-elements 1;

max-elements 1;

reference "3GPP TS 23.003";

uses types3gpp:ManagedNFProfile;

}

leaf-list supportedBMOList {

type string;

description "List of supported BMOs (Bridge Managed Objects) required

for integration with TSN system.";

}

}

augment /me3gpp:ManagedElement {

list UPFFunction {

description "5G Core UPF Function";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses UPFFunctionGrp;

}

uses mf3gpp:ManagedFunctionContainedClasses;

}

}

}

<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";

description "This IOC represents the SCP function in 5GC. For more information about the SCP, see 3GPP TS 23.501.";

reference "3GPP TS 28.541";

revision 2019-10-20 {

description "initial revision";

reference "Based on

3GPP TS 28.541";

}

grouping SCPFunctionGrp {

uses mf3gpp:ManagedFunctionGrp;

leaf address {

description "The host address of the SCP.";

type inet:host;

}

list supportedFuncList {

min-elements 1;

key "function";

uses types5g3gpp:SupportedFunc;

}

}

augment "/me3gpp:ManagedElement" {

list SCPFunction {

description "5G Core SCP Function";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses SCPFunctionGrp;

}

}

}

}

<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 2020-11-05 { reference CR-0411 ; }

revision 2019-10-20 { reference "initial revision"; }

grouping NEFFunctionGrp {

description "Represents the NEFFunction IOC";

uses mf3gpp:ManagedFunctionGrp;

leaf sBIFQDN {

description "The FQDN of the registered NF instance in the

service-based interface.";

type inet:domain-name;

}

list sNSSAIList {

description "List of S-NSSAIs the managed object is capable of supporting.

(Single Network Slice Selection Assistance Information)

An S-NSSAI has an SST (Slice/Service type) and an optional SD

(Slice Differentiator) field.";

key "sd sst";

uses types5g3gpp:SNssai;

}

leaf-list capabilityList {

description "List of supported capabilities of the NEF.";

reference "3GPP TS 23.003";

type string;

}

leaf isCAPIFSup {

type boolean;

}

}

augment "/me3gpp:ManagedElement" {

list NEFFunction {

description "5G Core NEF Function";

reference "3GPP TS 28.541";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses NEFFunctionGrp;

}

}

}

}

<CODE ENDS>

## H.5.28 module \_3gpp-5gc-nrm-QFQoSMonitoringControl.yang

<CODE BEGINS>

module \_3gpp-5gc-nrm-QFQoSMonitoringControl {

yang-version 1.1;

namespace urn:3gpp:sa5:\_3gpp-5gc-nrm-QFQoSMonitoringControl;

prefix qFQMCtrl3gpp;

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

import \_3gpp-5gc-nrm-smffunction { prefix smf3gpp; }

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

import \_3gpp-5g-common-yang-types { prefix types5g3gpp; }

organization "3gpp SA5";

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

description "This IOC represents the capabilities and properties for control

of QoS monitoring per QoS flow per UE for URLLC service defined

in 3GPP TS 23.501.";

reference "3GPP TS 28.541";

revision 2020-11-05 { reference CR-0411 ; }

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 gupqmc3gpp;

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 2021-01-25 { reference CR-0453; }

revision 2020-11-05 { reference CR-0411 ; }

revision 2020-09-30 { reference "CR-0377"; }

revision 2020-08-03 { reference "CR-0321"; }

revision 2020-04-10 { reference "S5-202103"; }

grouping GtpUPathDelayThresholdsType {

description "Thresholds for reporting the packet delay for GTP-U path QoS

monitoring ";

reference "3GPP TS 29.244";

leaf n3AveragePacketDelayThreshold {

mandatory true;

type uint32;

}

leaf n3MinPacketDelayThreshold {

mandatory true;

type uint32;

}

leaf n3MaxPacketDelayThreshold {

mandatory true;

type uint32;

}

leaf n9AveragePacketDelayThreshold {

mandatory true;

type uint32;

}

leaf n9MinPacketDelayThreshold {

mandatory true;

type uint32;

}

leaf n9MaxPacketDelayThreshold {

mandatory true;

type uint32;

}

}

grouping GtpUPathQoSMonitoringControlGrp {

description "Represents the GtpUPathQoSMonitoringControl IOC.";

leaf gtpUPathQoSMonitoringState {

description "The state of GTP-U path QoS monitoring.";

mandatory true;

type enumeration {

enum ENABLED;

enum DISABLED;

}

}

list gtpUPathMonitoredSNSSAIs {

key "sd sst";

description "The S-NSSAIs for which the the GTP-U path QoS monitoring is

to be performed.";

reference "3GPP TS 23.003";

uses types5g3gpp:SNssai;

}

leaf-list monitoredDSCPs {

description "The DSCPs for which the GTP-U path QoS monitoring is to be

performed.";

reference "3GPP TS 29.244";

type uint32;

}

leaf isEventTriggeredGtpUPathMonitoringSupported {

description "It indicates whether the event triggered GTP-U path QoS

monitoring reporting based on thresholds is supported.";

mandatory true;

reference "3GPP TS 29.244";

type boolean;

}

leaf isPeriodicGtpUMonitoringSupported {

description "It indicates whether the periodic GTP-U path QoS monitoring

reporting is supported.";

mandatory true;

reference "3GPP TS 29.244";

type boolean;

}

leaf isImmediateGtpUMonitoringSupported {

description "It indicates whether the immediate GTP-U path QoS monitoring

reporting is supported.";

mandatory true;

reference "3GPP TS 29.244";

type boolean;

}

list gtpUPathDelayThresholds {

key n3AveragePacketDelayThreshold;

// if max-elements is increased later, the key may need to be modified

min-elements 1;

max-elements 1;

description "It specifies the thresholds for reporting the packet delay

for the GTO-U path QoS monitoring.";

uses GtpUPathDelayThresholdsType;

}

leaf gtpUPathMinimumWaitTime {

description "It specifies the minimum waiting time (in seconds) between

two consecutive reports for event triggered GTP-U path QoS monitoring

reporting.";

type uint32;

}

leaf gtpUPathMeasurementPeriod {

description "It specifies the period (in seconds) for reporting the packet

delay for GTP-U path QoS monitoring.";

type uint32;

}

}

augment "/me3gpp:ManagedElement/smf3gpp:SMFFunction" {

list GtpUPathQoSMonitoringControl {

description "Specifies the capabilities and properties for control of

GTP-U path QoS monitoring. For more information about the GTP-U path

QoS monitoring.";

reference "3GPP TS 23.501";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses GtpUPathQoSMonitoringControlGrp;

}

}

}

}

<CODE ENDS>

## H.5.30 module \_3gpp-5gc-nrm-Configurable5QISet.yang

<CODE BEGINS>

module \_3gpp-5gc-nrm-configurable5qiset {

yang-version 1.1;

namespace urn:3gpp:sa5:\_3gpp-5gc-nrm-configurable5qiset;

prefix Conf5QIs3gpp;

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

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

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

organization "3gpp SA5";

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

description "This IOC represents the configurable 5QIs, including

their QoS characteristics, that need to be pre-configured

(and configurable) to the 5G NFs.";

reference "3GPP TS 28.541";

revision 2022-04-29 { reference "CR-0730"; }

revision 2020-08-03 { reference "CR-0321"; }

revision 2020-06-03 { reference "CR-0286"; }

grouping PacketErrorRate {

leaf scalar {

type uint32 {

range 0..9 ;

}

mandatory true;

description "The Packet Error Rate of a 5QI expressed as Scalar x 10-k

where k is the Exponent.";

}

leaf exponent {

type uint32 {

range 0..9 ;

}

mandatory true;

description "The Packet Error Rate of a 5QI expressed as Scalar x 10-k,

where k is the Exponent.";

}

}

grouping FiveQICharacteristics {

leaf fiveQIValue {

type uint32 {

range 0..255 ;

}

mandatory true;

description "Identifies the 5QI value.";

}

leaf resourceType {

type enumeration {

enum GBR;

enum NON\_GBR;

}

mandatory true;

description "It indicates the Resource Type of a 5QI, as specified

in TS 23.501 ";

}

leaf priorityLevel {

type uint32 {

range 0..127 ;

}

}

leaf packetDelayBudget {

type uint32 {

range 0..1023 ;

}

description "Indicates the Packet Delay Budget (in unit of 0.5ms)of a 5QI,

as specified in TS 23.501 ";

}

list packetErrorRate {

key "scalar exponent";

min-elements 0;

max-elements 1;

uses PacketErrorRate;

reference "TS 23.501";

}

leaf averagingWindow {

type uint32 {

range 0..4095 ;

}

units ms;

reference "TS 23.501";

}

leaf maximumDataBurstVolume {

type uint32{

range 0..4095 ;

}

units byte;

}

}

grouping Configurable5QISetGrp {

description "Represents the Configurable5QISet IOC.";

list configurable5QIs {

key "fiveQIValue";

uses FiveQICharacteristics;

}

}

grouping Configurable5QISetSubtree {

list Configurable5QISet {

description "Specifies the non-standardized 5QIs, including their QoS

characteristics, that need to be pre-configured (and configurable) to

the 5G NFs, see 3GPP TS 23.501.";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses Configurable5QISetGrp;

}

}

}

augment "/subnet3gpp:SubNetwork" {

uses Configurable5QISetSubtree;

}

augment "/me3gpp:ManagedElement" {

uses Configurable5QISetSubtree;

}

}

<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, as specified in TS 28.541.";

}

leaf dscp {

type uint32 {

range 0..255 ;

}

mandatory true;

}

}

grouping FiveQiDscpMappingSetGrp {

description "Represents the FiveQiDscpMappingSet IOC.";

list FiveQiDscpMappingList {

key "dscp";

uses FiveQiDscpMapping;

}

}

grouping FiveQiDscpMappingSetSubtree {

list FiveQiDscpMappingSet {

description "Specifies the mapping between 5QIs and DSCPs.";

key id;

uses top3gpp:Top\_Grp;

container attributes {

uses FiveQiDscpMappingSetGrp;

}

}

}

augment "/me3gpp:ManagedElement/smf3gpp:SMFFunction" {

uses FiveQiDscpMappingSetSubtree;

}

}

<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 PrePcRul3gpp;

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 2021-01-25 { reference "CR-0453"; }

revision 2020-09-30 { reference "CR-0377"; }

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 "3GPPTS 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 "3GPPTS 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 "3GPPTS 29.512 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 deactivatedTS 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 "TS 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 "3GPPTS 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;

}

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 7042.";

}

leaf ethType {

type string;

mandatory true;

description "A two-octet string that represents the Ethertype.";

reference " IEEE 802.3 and IETF RFC 7042in 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 802.1Qand

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 2020-09-30 { reference "CR-0377"; }

revision 2020-08-06 { reference "CR-0333"; }

grouping Dynamic5QISetGrp {

description "Represents the Dynamic5QISet IOC.";

list dynamic5QIs {

key "fiveQIValue";

description "Represents the Dynamic5QISet IOC.";

uses Conf5QIs3gpp:FiveQICharacteristics;

}

}

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;

}

}

}

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):  
XML definitions for network slice

# I.1 General

This annex contains the XML definitions for the network slice NRM, in accordance with network slice NRM Information Model definitions specified in clause 6.

# I.2 Architectural features

The overall architectural feature of network slice information model is specified in clause 6, this clause specifies features that are specific to the Schema definitions.

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

# I.3 Mapping

## I.3.1 General mapping

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

## I.3.2 Information Object Class (IOC) mapping

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

# I.4 Solution Set (SS) definitions

## I.4.1 XML definition structure

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

This annex defines the NRM-specific XML schema sliceNrm.xsd for the network slice Information Model defined in clause 6.

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

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

## I.4.2 Graphical representation

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

## I.4.3 XML schema "sliceNrm.xsd"

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

<!--

3GPP TS 28.541 network slice Network Resource Model

XML schema definition

sliceNrm.xsd

-->

<schema xmlns="http://www.w3.org/2001/XMLSchema"

xmlns:xn="http://www.3gpp.org/ftp/specs/archive/28\_series/28.623#genericNrm"

xmlns:sl="http://www.3gpp.org/ftp/specs/archive/28\_series/28.541#sliceNrm"

xmlns:nn="http://www.3gpp.org/ftp/specs/archive/28\_series/28.541#nrNrm"

xmlns:ngc="http://www.3gpp.org/ftp/specs/archive/28\_series/28.541#ngcNrm"

xmlns:en="http://www.3gpp.org/ftp/specs/archive/28\_series/28.659#eutranNrm"

xmlns:sm="http://www.3gpp.org/ftp/specs/archive/28\_series/28.626#stateManagementIRP"

targetNamespace="http://www.3gpp.org/ftp/specs/archive/28\_series/28.541#sliceNrm" elementFormDefault="qualified">

<import namespace="http://www.3gpp.org/ftp/specs/archive/28\_series/28.623#genericNrm"/>

<import namespace="http://www.3gpp.org/ftp/specs/archive/28\_series/28.541#nrNrm"/>

<import namespace="http://www.3gpp.org/ftp/specs/archive/28\_series/28.541#ngcNrm"/>

<import namespace="http://www.3gpp.org/ftp/specs/archive/28\_series/28.659#eutranNrm"/>

<import namespace="http://www.3gpp.org/ftp/specs/archive/28\_series/28.626#stateManagementIRP"/>

<simpleType name="MobilityLevel">

<restriction base="string">

<enumeration value="STATIONARY"/>

<enumeration value="NOMADIC"/>

<enumeration value="RESTRICTED MOBILITY"/>

<enumeration value="FULLY MOBILITY"/>

</restriction>

</simpleType>

<simpleType name="SharingLevel">

<restriction base="string">

<enumeration value="SHARED"/>

<enumeration value="NON-SHARED"/>

</restriction>

</simpleType>

<simpleType name="Category">

<restriction base="string">

<enumeration value="character"/>

<enumeration value="scalability"/>

</restriction>

</simpleType>

<simpleType name="Tagging">

<restriction base="string">

<enumeration value="performance"/>

<enumeration value="function"/>

<enumeration value="operation"/>

</restriction>

</simpleType>

<simpleType name="Exposure">

<restriction base="string">

<enumeration value="API"/>

<enumeration value="KPI"/>

</restriction>

</simpleType>

<complexType name="ServAttrCom">

<sequence>

<element name="category" type="sl:Category"/>

<element name="tagging" type="sl:Tagging" minOccurs="0" maxOccurs="3"/>

<element name="exposure" type="sl:Exposure" minOccurs="0"/>

</sequence>

</complexType >

<simpleType name="DelayToleranceSupport">

<restriction base="string">

<enumeration value="NOT SUPPORTED"/>

<enumeration value="SUPPORTED"/>

</restriction>

</simpleType>

<simpleType name="DeterministicCommAvailability">

<restriction base="string">

<enumeration value="NOT SUPPORTED"/>

<enumeration value="SUPPORTED"/>

</restriction>

</simpleType>

<simpleType name="UserMgmtOpenSupport">

<restriction base="string">

<enumeration value="NOT SUPPORTED"/>

<enumeration value="SUPPORTED"/>

</restriction>

</simpleType>

<simpleType name="V2XCommModelsV2XMode">

<restriction base="string">

<enumeration value="NOT SUPPORTED"/>

<enumeration value="SUPPORTED BY NR"/>

</restriction>

</simpleType>

<complexType name="DelayTolerance">

<sequence>

<element name="servAttrCom" type="sl:ServAttrCom"/>

<element name="support" type="sl:DelayToleranceSupport"/>

</sequence>

</complexType>

<complexType name="DeterministicComm">

<sequence>

<element name="servAttrCom" type="sl:ServAttrCom"/>

<element name="availability" type="sl:DeterministicCommAvailability"/>

<element name="periodicityList" type="string"/>

</sequence>

</complexType>

<complexType name="DLThpt">

<sequence>

<element name="servAttrCom" type="sl:ServAttrCom"/>

<element name="guaThpt" type="float"/>

<element name="maxThpt" type="float"/>

</sequence>

</complexType>

<complexType name="ULThpt">

<sequence>

<element name="servAttrCom" type="sl:ServAttrCom"/>

<element name="guaThpt" type="float" minOccurs="0"/>

<element name="maxThpt" type="float" minOccurs="0"/>

</sequence>

</complexType>

<complexType name="MaxPktSize">

<sequence>

<element name="servAttrCom" type="sl:ServAttrCom"/>

<element name="maxsize" type="integer"/>

</sequence>

</complexType>

<complexType name="KPIMonitoring">

<sequence>

<element name="servAttrCom" type="sl:ServAttrCom"/>

<element name="kPIList" type="string"/>

</sequence>

</complexType>

<complexType name="UserMgmtOpen">

<sequence>

<element name="servAttrCom" type="sl:ServAttrCom"/>

<element name="support" type="sl:UserMgmtOpenSupport"/>

</sequence>

</complexType>

<complexType name="V2XCommMode">

<sequence>

<element name="servAttrCom" type="sl:ServAttrCom"/>

<element name="v2XMode" type="sl:V2XCommModelsV2XMode"/>

</sequence>

</complexType>

<complexType name="TermDensity">

<sequence>

<choice minOccurs="1" maxOccurs="1">

<element name="servAttrCom" type="sl:ServAttrCom"/>

<element name="density" type="integer"/>

</choice>

</sequence>

</complexType>

<complexType name="ServiceProfile">

<sequence>

<element name="serviceProfileId" type="string"/>

<element name="sNSSAIList" type="ngc:SnssaiList"/>

<element name="pLMNIdList" type="en:PLMNIdList"/>

<element name="maxNumberofUEs" type="long" minOccurs="0"/>

<element name="latency" type="integer" minOccurs="0"/>

<element name="uEMobilityLevel" type="integer" minOccurs="0"/>

<element name="resourceSharingLevel" type="integer" minOccurs="0"/>

<element name="sst" type="ngc:Sst"/>

<element name="availability" type="float" minOccurs="0"/>

<element name="delayTolerance" type="sl:DelayTolerance" minOccurs="0"/>

<element name="deterministicComm" type="sl:DeterministicComm" minOccurs="0"/>

<element name="dLThptPerSlice" type="sl:DLThpt" minOccurs="0"/>

<element name="dLThptPerUE" type="sl:DLThpt" minOccurs="0"/>

<element name="uLThptPerSlice" type="sl:ULThpt" minOccurs="0"/>

<element name="uLThptPerUE" type="sl:ULThpt" minOccurs="0"/>

<element name="maxPktSize" type="sl:MaxPktSize" minOccurs="0"/>

<element name="maxNumberofConns" type="sl:MaxNumberofConns" minOccurs="0"/>

<element name="kPIMonitoring" type="sl:KPIMonitoring" minOccurs="0"/>

<element name="userMgmtOpen" type="sl:UserMgmtOpen" minOccurs="0"/>

<element name="v2XCommModels" type="sl:V2XCommMode" minOccurs="0"/>

<element name="coverageArea" type="string" minOccurs="0"/>

<element name="termDensity" type="sl:TermDensity" minOccurs="0"/>

<element name="activityFactor" type="float" minOccurs="0"/>

<element name="uESpeed" type="integer" minOccurs="0"/>

<element name="jitter" type="integer" minOccurs="0"/>

<element name="survivalTime" type="string" minOccurs="0"/>

<element name="reliability" type="string" minOccurs="0"/>

</sequence>

</complexType>

<complexType name="ServiceProfileList">

<sequence>

<element name="serviceProfile" type="sl:ServiceProfile"/>

</sequence>

</complexType>

<complexType name="SliceProfile">

<sequence>

<element name="sliceProfileId" type="string"/>

<element name="sNSSAIList" type=" ngc:SnssaiList"/>

<element name="pLMNIdList" type="en:PLMNIdList"/>

<element name="perfReq" type="sl:PerfReq"/>

<element name="maxNumberofUEs" type="long" minOccurs="0"/>

<element name="coverageAreaTAList" type="ngc:NrTACList" minOccurs="0"/>

<element name="latency" type="integer" minOccurs="0"/>

<element name="uEMobilityLevel" type="sl:MobilityLevel" minOccurs="0"/>

<element name="resourceSharingLevel" type="integer" minOccurs="0"/>

</sequence>

</complexType>

<complexType name="SliceProfileList">

<sequence>

<element name="sliceProfile" type="sl:SliceProfile"/>

</sequence>

</complexType>

<complexType name="NsInfo">

<!-- Refer to definitions in subclause 8.3.3.2.2 of ETSI NFV IFA013 -->

<sequence>

<element name="nsInstanceId" type="string"/>

<element name="nsName" type="string"/>

<element name="description" type="string"/>

</sequence>

</complexType>

<element name="NetworkSlice" substitutionGroup="xn:SubNetworkOptionallyContainedNrmClass">

<complexType>

<complexContent>

<extension base="xn:NrmClass">

<sequence>

<element name="attributes">

<complexType>

<all>

<!-- Inherited attributes from SubNetwork -->

<element name="dnPrefix" type="string" minOccurs="0"/>

<element name="userLabel" type="string"/>

<element name="userDefinedNetworkType" type="string"/>

<element name="setOfMcc" type="string" minOccurs="0"/>

<element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>

<!-- End of inherited attributes from SubNetwork -->

<element name="operationalState" type="sm:operationalStateType"/>

<element name="administrativeState" type="sm:administrativeStateType"/>

<element name="serviceProfileList" type="sl:ServiceProfileList"/> <element *name*="networkSliceSubnetRef" *type*="xn:dn"/>

</all>

</complexType>

</element>

<choice minOccurs="0" maxOccurs="unbounded">

<element ref="xn:MeasurementControl"/>

</choice>

</sequence>

</extension>

</complexContent>

</complexType>

</element>

<element name="NetworkSliceSubnet" substitutionGroup="xn:SubNetworkOptionallyContainedNrmClass">

<complexType>

<complexContent>

<extension base="xn:NrmClass">

<sequence>

<element name="attributes">

<complexType>

<all>

<!-- Inherited attributes from SubNetwork -->

<element name="dnPrefix" type="string" minOccurs="0"/>

<element name="userLabel" type="string"/>

<element name="userDefinedNetworkType" type="string"/>

<element name="setOfMcc" type="string" minOccurs="0"/>

<element name="measurements" type="xn:MeasurementTypesAndGPsList" minOccurs="0"/>

<!-- End of inherited attributes from SubNetwork -->

<element name="operationalState" type="sm:operationalStateType"/>

<element name="administrativeState" type="sm:administrativeStateType"/>

<element name="nsInfo" type="sl:NsInfo" minOccurs="0"/>

<element name="sliceProfileList" type="sl:SliceProfileList"/>

<element *name*="managedFunctionRef" *type*="xn:dnlist"/>

<element *name*="networkSliceSubnetRef" *type*="xn:dnlist"/>

</all>

</complexType>

</element>

<choice minOccurs="0" maxOccurs="unbounded">

<element ref="xn:MeasurementControl"/>

</choice>

</sequence>

</extension>

</complexContent>

</complexType>

</element>

</schema>

Annex J (normative):  
OpenAPI definition of the Slice NRM

# J.1 General

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

The Information Service (IS) of the NR NRM is defined in clause 6.

Mapping rules to produce the OpenAPI definition based on the IS are defined in 3GPP TS 32.160 [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: 16.16.0

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

- FULL\_MOBILITY

SharingLevel:

type: string

enum:

- SHARED

- NON\_SHARED

NetworkSliceSharingIndicator:

type: string

enum:

- SHARED

- NON\_SHARED

PerfReqEmbb:

type: object

properties:

expDataRateDL:

type: number

expDataRateUL:

type: number

areaTrafficCapDL:

type: number

areaTrafficCapUL:

type: number

userDensity:

type: number

activityFactor:

type: number

PerfReqEmbbList:

type: array

items:

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

PerfReqUrllc:

type: object

properties:

cSAvailabilityTarget:

type: number

cSReliabilityMeanTime:

type: string

expDataRate:

type: number

msgSizeByte:

type: string

transferIntervalTarget:

type: string

survivalTime:

type: string

PerfReqUrllcList:

type: array

items:

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

PerfReq:

oneOf:

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

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

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

DLThptPerSlice:

type: object

properties:

servAttrCom:

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

guaThpt:

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

maxThpt:

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

DLThptPerUE:

type: object

properties:

servAttrCom:

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

guaThpt:

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

maxThpt:

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

ULThptPerSlice:

type: object

properties:

servAttrCom:

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

guaThpt:

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

maxThpt:

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

ULThptPerUE:

type: object

properties:

servAttrCom:

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

guaThpt:

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

maxThpt:

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

MaxPktSize:

type: object

properties:

servAttrCom:

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

maxsize:

type: integer

MaxNumberofConns:

type: object

properties:

servAttrCom:

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

nOofConn:

type: integer

KPIMonitoring:

type: object

properties:

servAttrCom:

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

kPIList:

type: array

items:

type: string

UserMgmtOpen:

type: object

properties:

servAttrCom:

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

support:

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

V2XCommMode:

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

ServiceProfile:

type: object

properties:

serviceProfileId:

type: string

plmnInfoList:

$ref: 'TS28541\_NrNrm.yaml#/components/schemas/PlmnInfoList'

maxNumberofUEs:

type: number

latency:

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'

deterministicComm:

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

dLThptPerSlice:

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

dLThptPerUE:

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

uLThptPerSlice:

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

uLThptPerUE:

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

maxPktSize:

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

maxNumberofConns:

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

kPIMonitoring:

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

userMgmtOpen:

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

v2XCommMode:

$ref: '#/components/schemas/V2XCommMode'

coverageArea:

type: array

items:

type: string

termDensity:

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

activityFactor:

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

uESpeed:

type: integer

jitter:

type: integer

survivalTime:

type: string

reliability:

type: string

SliceProfile:

type: object

properties:

sliceProfileId:

type: string

plmnInfoList:

$ref: 'TS28541\_NrNrm.yaml#/components/schemas/PlmnInfoList'

perfReq:

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

maxNumberofUEs:

type: number

coverageAreaTAList:

type: array

items:

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

latency:

type: number

uEMobilityLevel:

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

resourceSharingLevel:

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

IpAddress:

oneOf:

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

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

ServiceProfileList:

type: array

items:

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

SliceProfileList:

type: array

items:

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

#------------ 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'

NetworkSlice-Single:

allOf:

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

- type: object

properties:

attributes:

allOf:

- type: object

properties:

networkSliceSubnetRef:

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

operationalState:

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

administrativeState:

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

serviceProfileList:

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

NetworkSliceSubnet-Single:

allOf:

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

- type: object

properties:

attributes:

allOf:

- type: object

properties:

managedFunctionRefList:

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

networkSliceSubnetRefList:

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

operationalState:

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

administrativeState:

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

nsInfo:

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

sliceProfileList:

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

epTransportRefList:

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

priorityLabel:

type: integer

EP\_Transport-Single:

allOf:

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

- type: object

properties:

attributes:

type: object

properties:

ipAddress:

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

logicInterfaceId:

type: string

nextHopInfo:

type: string

qosProfile:

type: string

epApplicationRefs:

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

#-------- 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'

#------------ 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'Annex K (normative):  
Void

Annex L (normative):  
Relation of GSMA GST, ServiceProfile and SliceProfile

# L.1 General

This annex describes the relation between GSMA GST[50] and information model ServiceProfile and SliceProfile.

# L.2 GSMA GST, ServiceProfile and sliceProfile

The GSMA GST is used as the SLA information for the communication between the 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 [50] is translated and used as input to NRM ServiceProfile, the ServiceProfile can be translated to corresponding requirements for dedicated domains. For example, 5GC SliceProfile is used to carry 5GC domain requirements, NG-RAN SliceProfile is used to carry NG-RAN domain requirements, and TN requirements are translated and provide to TN domain. Some of the information in 5GC SliceProfile and NG-RAN SliceProfile translated to configurable parameters of network function for the control plane SLA support purpose.

NOTE: how to do the translation is out of the scope of the present document.

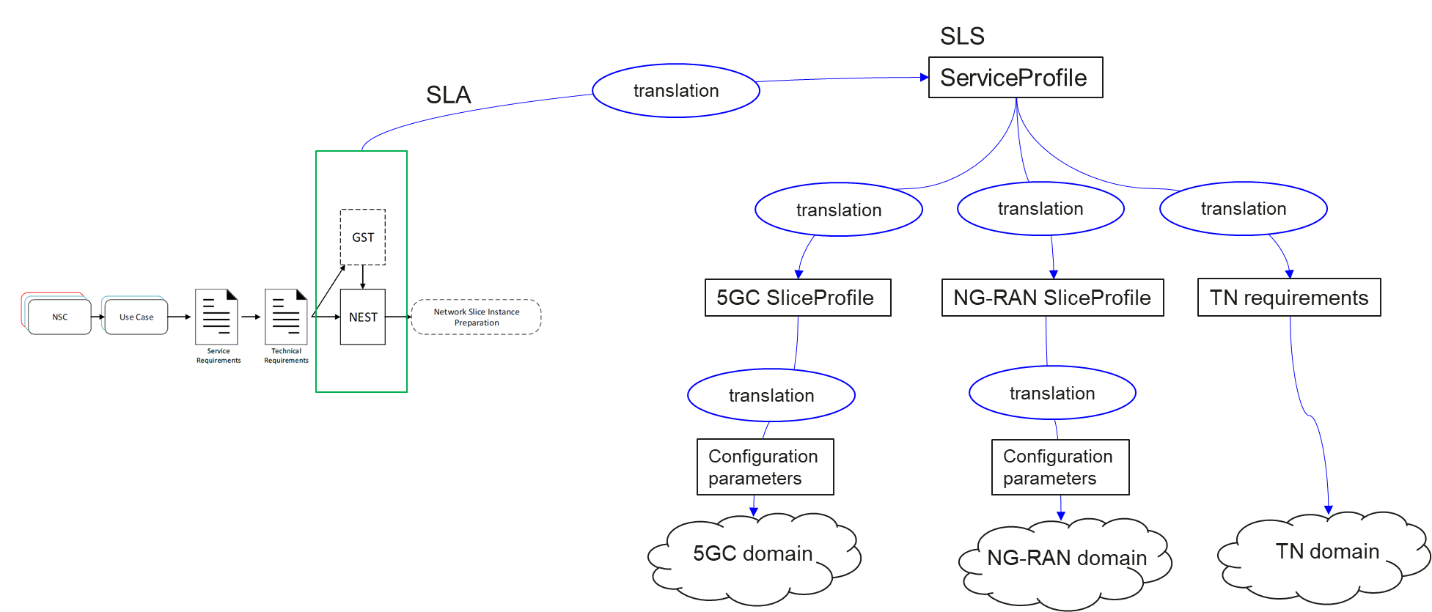


Figure L.2-1 Relation between GSMA GST, ServiceProfile and SliceProfile

Annex M (normative):  
Managed NF Service state handling

# M.1 Combined state diagram for a Managed NF Service



Figure M.1-: 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 unavilable.  Action: Deregister the NF Service on behalf of the NF, and set the registration state of the MSI to Deregistered. |
| 8 | Event: Received CM operation to lock the NF Service or the NF.  Action: Set the Administrative state of the MSI to Locked.  Note: Changing Administrative state on NF service level is optional |
| 9 | Event: Received information that the NF Service is terminated or deleted,  Action: Delete the MSI and set its state to NULL. |

Annex N (informative):   
Mapping between GSMA GST and ServiceProfile

Table N-1 shows the mapping from the GSMA GST, see reference [50] to the ServiceProfile which can be found in clause 6.3.3 of the present document.

Table N-1: Mapping between GSMA GST and ServiceProfile

|  |  |  |  |
| --- | --- | --- | --- |
| GSMA GST attribute name [50] | GST reference location [50] | ServiceProfile attribute | Clause number (see NOTE) |
| Availability | 3.4.1 | availability | 6.4.1 |
| Area of service | 3.4.2 | coverageArea | 6.4.1 |
| Delay tolerance | 3.4.3 | delayTolerance | 6.4.1 and 6.3.7 |
| Deterministic communication | 3.4.4 | deterministicComm | 6.4.1 |
| Maximum supported packet size | 3.4.11 | MaxPktSize | 6.4.1 and 6.3.11 |
| Downlink throughput per network slice | 3.4.5 | dLThptPerSlice | 6.4.1 and 6.3.9 |
| Uplink throughput per network slice | 3.4.31 | uLThptPerSlice | 6.4.1 and 6.3.9 |
| Downlink maximum throughput per UE | 3.4.6 | dLThptPerUE | 6.4.1 and 6.3.9 |
| Uplink maximum throughput per UE | 3.4.32 | uLThptPerUE | 6.4.1 and 6.3.9 |
| Energy efficiency | 3.4.7 | NA | NA |
| Performance monitoring | 3.4.18 | kPIMonitoring | 6.4.1 and 6.3.14 |
| Number of connections | 3.4.16 | maxNumberofConns | 6.4.1 and 6.3.12 |
| Number of terminals | 3.4.17 | maxNumberofUEs | 6.4.1 and 6.3.38 |
| NB-IoT support | 3.4.14 | NA | NA |
| Positioning support | 3.4.20 | NA | NA |
| Radiospectrum | 3.4.21 | NA | NA |
| Simultaneous use of the network slice | 3.4.25 | NA | NA |
| Synchronicity | 3.4.29 | NA | NA |
| Terminal density | 3.4.30 | termDensity | 6.4.1 and 6.3.17 |
| Supported device velocity | 3.4.28 | uESpeed | 6.4.1 |
| User management openness | 3.4.33 | userMgmtOpen | 6.4.1 and 6.3.14 |
| V2X communication mode | 3.4.35 | v2XCommModels | 6.4.1 and 6.3.16 |
| Latency from (last) UPF to Application Server | 3.4.36 | NA | NA |
| Network Slice Specific Authentication and Authorization (NSSAA) Required | 3.4.37 | NA | NA |
| Slice quality of service parameters | 3.4.26 | NA | NA |
| Performance prediction | 3.4.19 | NA | NA |
| User data access | 3.4.34 | NA | NA |
| Isolation level | 3.4.9 | NA | NA |
| Group communication support | 3.4.8 | NA | NA |
| Mission critical support | 3.4.12 | NA | NA |
| MMTel support | 3.4.13 | NA | NA |
| Network Slice Customer network functions | 3.4.15 | NA | NA |
| Monitoring and analytics | 3.4.23 | NA | NA |
| Session and Service Continuity support | 3.4.24 | NA | NA |
| Support for non-IP traffic | 3.4.27 | NA | NA |
| NOTE: The attribute definitions can be found in clause 6.4, there where the attribute is defined by a custom data type the clause for the data type definition is also mentioned. | | | |

Annex O (informative):  
Change history

| **Change history** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Date | Meeting | TDoc | CR | Rev | Cat | Subject/Comment | New version |
| 2018-09 | SA#81 |  |  |  |  | Upgrade to change control version | 15.0.0 |
| 2018-09 | SA#81 |  |  |  |  | EdiHelp review | 15.0.1 |
| 2018-12 | SA#82 | SP-181046 | 0001 | 1 | F | Fix issues raised by EditHelp | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0002 | 2 | F | Update NR Stage 2 definition to align with TS 37.340 for MR-DC | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0003 | 1 | F | Update NRM Stage 2 defintion to align with TS 23.501 for 5G architecture | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0005 | 1 | F | Update Stage 3 XML definition of NR to align with Stage 2 content | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0006 | 1 | F | Update Stage 3 JSON definition of NR to align with Stage 2 content | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0007 | 1 | F | Update Stage 3 YANG definition of NR to align with Stage 2 content | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0008 | 1 | F | Update Stage 3 XML definition of 5GC to align with Stage 2 content | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0009 | 1 | F | Update Stage 3 JSON definition of 5GC to align with Stage 2 content | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0011 | 1 | F | Update stage 3 XML definition of NS to align with Stage 2 content | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0012 | 1 | F | Update Stage 3 JSON definition of NS to align with Stage 2 content | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0013 | 1 | F | Update stage 3 YANG definition of NS to align with Stage 2 content | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0014 | 1 | F | Correct the term sNSSAIList and nRTAClist | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0015 | 1 | F | Update the inheritance hierarchy figure for NR NRM to include BWP IOC and NRSectorCarrier IOC | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0016 | 1 | F | Change the term nCGI to nCI | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0019 | 1 | F | Align properties of cell state | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0021 | 1 | F | Add missing attribute definition and condition | 15.1.0 |
| 2018-12 | SA#82 | SP-181047 | 0022 | 1 | F | Add missing detail definition for attribute | 15.1.0 |
| 2018-12 | SA#82 | SP-181047 | 0023 | 1 | F | Adding missing attribute, and correction of reference | 15.1.0 |
| 2018-12 | SA#82 | SP-181043 | 0025 | - | F | Remove NSSF from the abbrevations | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0027 | - | F | Replace symbol for network slice state management | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0031 | 1 | F | Remove the ExternalENBFunction definition | 15.1.0 |
| 2018-12 | SA#82 | SP-181046 | 0033 | 1 | F | Align the management of external function and cell with TS 28.658 | 15.1.0 |
| 2018-12 | SA#82 | SP-181156 | 0034 | 1 | F | Update NR NRM with Cell Relation | 15.1.0 |
| 2018-12 | SA#82 | SP-181156 | 0038 | 3 | F | RRM Policy enhancements | 15.1.0 |
| 2018-12 | SA#82 | SP-181156 | 0039 | 1 | F | Fix containment issue in YANG definition | 15.1.0 |
| 2018-12 | SA#82 | SP-181156 | 0040 | - | F | Implement minor corrections | 15.1.0 |
| 2018-12 | SA#82 | SP-181042 | 0041 | - | F | Update Stage 3 NRM for RRM Policy enhancements | 15.1.0 |
| 2019-03 | SA#83 | SP-190121 | 0043 | 1 | F | Align NR attributes definition related to SSB with corresponding NG-RAN IE definition | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0044 | 1 | F | Correct the use of nCI and PLMN | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0045 | - | F | Remove duplicate definition for ExternalNRCellCU | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0046 | 2 | F | Correct class diagram for view on external entities | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0047 | 1 | F | Correct the definition for resourceSharingLevel | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0048 | 1 | F | Correction of references | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0052 | 1 | F | Align the term mFIdList and constituentNSSIIdList | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0053 | 1 | F | Correct the definition of nSSIId | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0054 | 1 | F | Add missing attribute constraint for class definition of NSSFFunction | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0055 | 1 | F | Correct attribute constraints for RRMpolicy related attributes in NRCellCU | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0057 | - | F | Correct cardinality of End Point (EP) to target | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0058 | 0 | F | Correct Import table | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0059 | - | F | Remove ExternalNRCellCU.pLMNIdList | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0060 | - | F | Use 'bS' (not 'bs') to prefix all BS (base station) attributes | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0061 | 1 | F | Correction of State attributes descriptions | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0062 | - | F | Update 5G JSON Solution Set to align with generic NRM | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0063 | 1 | F | Update YANG Solution Set to align with Stage 2 definition | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0064 | 1 | F | Update Information Service to fix Network Slice modeling issue | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0065 | 1 | F | Update Solution Set to fix Network Slice modeling issue | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0066 | 1 | F | Add availability in service profile of network slice resource model | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0068 | 1 | F | Add sST attribute to ServiceProfile | 15.2.0 |
| 2019-03 | SA#83 | SP-190121 | 0069 | 1 | F | Update to sST attribute stage 3 | 15.2.0 |
| 2019-03 | SA#83 | SP-190149 | 0073 | 2 | F | Replace CoverageAreaTAList type definition | 16.0.0 |
| 2019-03 | SA#83 | SP-190149 | 0074 | 1 | F | Name datatypes SliceProfile and ServiceProfile | 16.0.0 |
| 2019-03 | SA#83 | SP-190149 | 0075 | 1 | F | Add datatype definition for S-NSSAI | 16.0.0 |
| 2019-03 | SA#83 | SP-190149 | 0076 | 1 | F | Remove incomplete description for TAC | 16.0.0 |
| 2019-03 | SA#83 | SP-190149 | 0079 | 1 | F | Name datatype RRMPolicyRatio2 | 16.0.0 |
| 2019-06 | SA#84 | SP-190374 | 0083 | - | A | Remove attribute availabilityStatus in NRCellDU IOC | 16.1.0 |
| 2019-06 | SA#84 | SP-190373 | 0085 | 1 | F | Correct the definition for nsInfo | 16.1.0 |
| 2019-06 | SA#84 | SP-190374 | 0088 | 1 | A | Update Information Service of NR to fix unclear Note issue | 16.1.0 |
| 2019-06 | SA#84 | SP-190373 | 0096 | 2 | A | Correct the use of plmnIdList | 16.1.0 |
| 2019-06 | SA#84 | SP-190373 | 0098 | 1 | F | Add missing clauses to RRMPolicyRatio2 data type | 16.1.0 |
| 2019-06 | SA#84 | SP-190373 | 0099 | 1 | F | Update RRMPolicyRatio2 data type name in stage 3 | 16.1.0 |
| 2019-06 | SA#84 | SP-190373 | 0102 | - | F | Fix the implementation errors | 16.1.0 |
| 2019-09 | SA#85 | SP-190745 | 0089 | 2 | B | Update 5GC Information Service to align with Managed Service Definition | 16.2.0 |
| 2019-09 | SA#85 | SP-190743 | 0107 | 1 | A | Correct description for NR deployment scenario | 16.2.0 |
| 2019-09 | SA#85 | SP-190743 | 0109 | 1 | A | Correct NR NRM model to be applicable for all NG-RAN architecture | 16.2.0 |
| 2019-09 | SA#85 | SP-190745 | 0114 | 1 | C | Support NF Profile management | 16.2.0 |
| 2019-09 | SA#85 | SP-190743 | 0121 | 1 | A | Clarification of sNSSAIList attribute | 16.2.0 |
| 2019-09 | SA#85 | SP-190744 | 0123 | - | A | Remove pLMNId from GNBDUFunction | 16.2.0 |
| 2019-09 | SA#85 | SP-190743 | 0126 | 2 | A | Update class definition with inheritance information | 16.2.0 |
| 2019-09 | SA#85 | SP-190743 | 0128 | 1 | A | Correct description of NRCellCU and NRCellDU to be applicable for all deployment scenarios | 16.2.0 |
| 2019-09 | SA#85 | SP-190743 | 0130 | - | A | Correct XML solution set for NR | 16.2.0 |
| 2019-09 | SA#85 | SP-190743 | 0132 | - | A | Correct XML solution set for Network slice | 16.2.0 |
| 2019-09 | SA#85 | SP-190750 | 0133 | 1 | F | Clarification on slice model | 16.2.0 |
| 2019-09 | SA#85 | SP-190743 | 0142 | 1 | A | Add YANG mount info | 16.2.0 |
| 2019-09 | SA#85 | SP-190743 | 0143 | - | A | Add YANG solution | 16.2.0 |
| 2019-09 | SA#85 | SP-190745 | 0149 | 1 | F | generate JSON definition for 5GC NRM based on new style guideline | 16.2.0 |
| 2019-09 | SA#85 | SP-190744 | 0150 | 1 | A | Fix NR NRM to add missed ID info | 16.2.0 |
| 2019-09 | SA#85 | SP-190744 | 0152 | - | F | XML Solution Set for 5GC | 16.2.0 |
| 2019-09 | SA#85 | SP-190744 | 0154 | - | A | Correct ETSI NFV reference | 16.2.0 |
| 2019-09 | SA#85 | SP-190744 | 0157 | 1 | A | generate JSON definition for Slice NRM based on new style guideline | 16.2.0 |
| 2019-09 | SA#85 | SP-190744 | 0158 | 1 | A | generate JSON definition for NR NRM based on new style guideline | 16.2.0 |
| 2019-12 | SA#86 | SP-191159 | 0146 | 3 | F | To syn up with v1540 stage 2 | 16.3.0 |
| 2019-12 | SA#86 | SP-191173 | 0156 | 2 | A | Correct Import table | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0161 | 1 | C | Extensions to PCF and UPF IOCs for support of TSC (Time Sensitive Communication) | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0166 | 1 | F | Correct XML solution set for NR | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0167 | 1 | F | Correct Network slice NRM | 16.3.0 |
| 2019-12 | SA#86 | SP-191173 | 0168 | 2 | A | Correct NR TAC attribute property | 16.3.0 |
| 2019-12 | SA#86 | SP-191173 | 0170 | - | A | Correction of the duplicated IOC NSSFFunction in daigram | 16.3.0 |
| 2019-12 | SA#86 | SP-191173 | 0172 | - | A | Correction of the wrong IOC names in transport view diagram---Not implemented, wrong baseline (MCC) | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0175 | 2 | F | XML Solution Set for 5GC | 16.3.0 |
| 2019-12 | SA#86 | SP-191170 | 0177 | 3 | C | Update on slice NRM | 16.3.0 |
| 2019-12 | SA#86 | SP-191170 | 0178 | 2 | B | Add relation of GST and profiles | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0180 | 3 | F | Update SEPP Stage 2 definition in 5GC NRM | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0182 | 1 | C | Add NEF Stage 2 definition in 5GC NRM | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0184 | 1 | C | Add SCP Stage 2 definition in 5GC NRM | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0185 | - | C | Add Stage 3 definitions of 5GC NRM to align with stage 2 | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0186 | 1 | C | Support communication model in 5GC NF - Stage 2 | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0192 | 1 | F | Fix merging errors of the specification | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0195 | - | C | Add State Handling diagram for NF service | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0197 | - | B | Updates to YANG SS | 16.3.0 |
| 2019-12 | SA#86 | SP-191170 | 0198 | 1 | C | Update XML definitions of ServiceProfile NRM | 16.3.0 |
| 2019-12 | SA#86 | SP-191170 | 0199 | 2 | C | Update JSON definitions of ServiceProfile NRM | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0200 | 1 | C | Add managedNFProfile definition for ngc NRM - stage3 | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0202 | 2 | B | Add the RIM monitoring parameters for remote interference management | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0212 | 2 | F | Correct Network slice NRM | 16.3.0 |
| 2019-12 | SA#86 | SP-191166 | 0213 | - | F | Update SEPP Stage 3 definition in 5GC NRM | 16.3.0 |
| 2019-12 | SA#86 | SP-191180 | 0222 | 2 | B | Management of NR ANR, Stage 2 | 16.3.0 |
| 2019-12 | SA#86 | SP-191180 | 0223 | - | B | Management of NR ANR, Stage 3 | 16.3.0 |
| 2019-12 | SA#86 | SP-191173 | 0226 | 1 | A | Add Stages 2 NRM Info Model definitions for beam managed object classes | 16.3.0 |
| 2019-12 | SA#86 | SP-191173 | 0227 | - | A | Add Stages 2 NRM Info Model definitions for beam managed object classes | 16.3.0 |
| 2020-03 | SA#87E | SP-200169 | 0163 | 4 | F | Correct the parameter sNSSAIList | 16.4.0 |
| 2020-03 | SA#87E | SP-200169 | 0179 | 3 | C | Update of RRM Policy | 16.4.0 |
| 2020-03 | SA#87E | SP-200169 | 0235 | - | F | Correction of reference | 16.4.0 |
| 2020-03 | SA#87E | SP-200169 | 0239 | 1 | F | Update the NR NRM to align with NG-RAN overview architecture | 16.4.0 |
| 2020-03 | SA#87E | SP-200169 | 0241 | - | F | Some correction on the NR NRM | 16.4.0 |
| 2020-03 | SA#87E | SP-200169 | 0242 | - | F | Fix merging errors of the specification | 16.4.0 |
| 2020-03 | SA#87E | SP-200169 | 0243 | 1 | F | Update NRM attribute definitions | 16.4.0 |
| 2020-03 | SA#87E | SP-200233 | 0245 | 2 | B | Add the RIM parameters for remote interference management | 16.4.0 |
| 2020-03 | SA#87E | SP-200234 | 0248 | 1 | F | Update on slice NRM and solution sets | 16.4.0 |
| 2020-03 | SA#87E | SP-200234 | 0250 | 1 | F | Update of GNBCUUPFunction NRM | 16.4.0 |
| 2020-03 | SA#87E | SP-200232 | 0253 | 2 | B | Add Stage 3 NRM Info Model definitions for RRMPolicy and PLMNInfo related CRs | 16.4.0 |
| 2020-03 | SA#87E | SP-200178 | 0254 | 1 | F | Correct CR implementation errors | 16.4.0 |
| 2020-03 | SA#87E | SP-200235 | 0255 | 1 | F | Add OpenAPI definitions required by the ProvMnS | 16.4.0 |
| 2020-03 | SA#87E | SP-200169 | 0258 |  | F | Correct errors in yang solution set | 16.4.0 |
| 2020-03 | SA#87E |  |  |  |  | Correction of implementation errrors | 16.4.1 |
| 2020-06 | SA#88-e | SP-200489 | 0259 | 1 | F | Update on the RRMpolicyRatio | 16.5.0 |
| 2020-06 | SA#88-e | SP-200493 | 0260 | - | F | Replace DN with better identifier for whitelists and blacklists management | 16.5.0 |
| 2020-06 | SA#88-e | SP-200603 | 0261 | 1 | B | Add IOC for control of QoS monitoring per QoS flow per UE | 16.5.0 |
| 2020-06 | SA#88-e | SP-200604 | 0262 | 1 | B | Add IOC for control of GTP-U path QoS monitoring | 16.5.0 |
| 2020-06 | SA#88-e | SP-200489 | 0263 | 1 | F | Correction of reference | 16.5.0 |
| 2020-06 | SA#88-e | SP-200493 | 0268 | - | B | ANR management for EN-DC architecture | 16.5.0 |
| 2020-06 | SA#88-e | SP-200484 | 0269 | 1 | F | Clarification on network slice related identifiers | 16.5.0 |
| 2020-06 | SA#88-e | SP-200484 | 0270 | - | F | Stage 3 update for clarification on network slice related identifiers | 16.5.0 |
| 2020-06 | SA#88-e | SP-200484 | 0274 | 1 | F | Correct sNSSAI definition in XML solution set | 16.5.0 |
| 2020-06 | SA#88-e | SP-200484 | 0275 | 1 | F | Clarify the NR NRM used for different deployment scenarios | 16.5.0 |
| 2020-06 | SA#88-e | SP-200484 | 0278 | - | F | Add missing notification types to the definition of common notifications | 16.5.0 |
| 2020-06 | SA#88-e | SP-200491 | 0279 | 1 | A | Update on NRCellDU | 16.5.0 |
| 2020-06 | SA#88-e | SP-200491 | 0281 | 1 | A | Update Clause 4.2.1.2 Inheritance UML diagram | 16.5.0 |
| 2020-06 | SA#88-e | SP-200490 | 0283 | 2 | B | new NRM fragment to support RIM stage 2 | 16.5.0 |
| 2020-06 | SA#88-e | SP-200490 | 0284 | 1 | B | new NRM fragment to support RIM stage 3 | 16.5.0 |
| 2020-06 | SA#88-e | SP-200489 | 0285 | - | F | Update stage 3 on the RRMpolicyRatio | 16.5.0 |
| 2020-06 | SA#88-e | SP-200605 | 0286 | 2 | B | Add IOC for configurable 5QIs | 16.5.0 |
| 2020-06 | SA#88-e | SP-200490 | 0287 | 1 | B | Add IOC for 5QI to DSCP mapping | 16.5.0 |
| 2020-06 | SA#88-e | SP-200493 | 0289 | - | B | Stage3 add the NRM fragment for SON management | 16.5.0 |
| 2020-06 | SA#88-e | SP-200493 | 0290 | - | B | ANR management for EN-DC architecture | 16.5.0 |
| 2020-06 | SA#88-e | SP-200493 | 0291 | 1 | B | Add the NRM fragment for SON management | 16.5.0 |
| 2020-06 | SA#88-e | SP-200490 | 0293 | - | F | Add CommModelList NRM definition | 16.5.0 |
| 2020-06 | SA#88-e | SP-200490 | 0294 | 1 | F | Update NRM attribute definitions | 16.5.0 |
| 2020-06 | SA#88-e | SP-200490 | 0295 | 1 | F | Correct NRM definition in XML solution | 16.5.0 |
| 2020-06 | SA#88-e | SP-200485 | 0300 | 1 | F | Clarification on the relation of GST, ServiceProfile and SliceProfile | 16.5.0 |
| 2020-06 | SA#88-e | SP-200496 | 0301 | 1 | B | Add ES coverage relation in NRCellRelation | 16.5.0 |
| 2020-06 | SA#88-e | SP-200490 | 0302 | - | F | Update the decription for RRMPolicy\_ and resouceType | 16.5.0 |
| 2020-06 | SA#88-e | SP-200490 | 0303 | - | F | Update definition for attribute localAddress in EP\_RP IOC | 16.5.0 |
| 2020-06 | SA#88-e | SP-200486 | 0305 | 1 | A | Correction of references | 16.5.0 |
| 2020-06 | SA#88-e | SP-200485 | 0306 | 1 | F | add transport information and slice mapping on backhaul endpoints | 16.5.0 |
| 2020-06 | SA#88-e | SP-200485 | 0307 | - | F | add transport information and slice mapping on backhaul endpoints stage 3 | 16.5.0 |
| 2020-06 | SA#88-e | SP-200490 | 0312 | 1 | F | Update SliceProfile attributes solution 1 | 16.5.0 |
| 2020-06 | SA#88-e | SP-200490 | 0315 | 1 | B | Add configuredMaxTxEIRP on NRSectorCarrier | 16.5.0 |
| 2020-06 | SA#88-e | SP-200490 | 0316 | - | B | Stage 3 Add configuredMaxTxEIRP on NRSectorCarrier | 16.5.0 |
| 2020-06 | SA#88-e | SP-200490 | 0318 | - | F | Update NRM YANG for 28.541 | 16.5.0 |
| 2020-06 | SA#88-e | SP-200496 | 0319 | - | B | Add ES coverage relation in NRCellRelation Stage 3 | 16.5.0 |
| 2020-06 | SA#88-e | SP-200612 | 0320 | 1 | F | Update openAPI for NRCellRelation and NRFreqRelation | 16.5.0 |
| 2020-09 | SA#89-e | SP-200729 | 0321 | - | F | Correction of NRM YANG errors | 16.6.0 |
| 2020-09 | SA#89-e | SP-200729 | 0322 | 1 | F | Correct on NR NRM | 16.6.0 |
| 2020-09 | SA#89-e | SP-200729 | 0323 | - | F | Correct the openAPI definition for NR NRM | 16.6.0 |
| 2020-09 | SA#89-e | SP-200730 | 0325 | - | A | Correct on frequency related IOC | 16.6.0 |
| 2020-09 | SA#89-e | SP-200729 | 0329 | 1 | B | Add IOC for predefined PCC rules | 16.6.0 |
| 2020-09 | SA#89-e | SP-200729 | 0330 | 2 | B | Add IOC for predefined PCC rules | 16.6.0 |
| 2020-09 | SA#89-e | SP-200729 | 0331 | - | B | Enable PCF to support configurable 5QIs | 16.6.0 |
| 2020-09 | SA#89-e | SP-200729 | 0332 | - | B | Add IOC for dynamic 5QIs - stage 2 | 16.6.0 |
| 2020-09 | SA#89-e | SP-200729 | 0333 | - | B | Add IOC for dynamic 5QIs - stage 3 | 16.6.0 |
| 2020-09 | SA#89-e | SP-200729 | 0334 | - | B | Add TCE mapping info in GNBCUCPFunction | 16.6.0 |
| 2020-09 | SA#89-e | SP-200729 | 0335 | - | B | Add TCE mapping info in openAPI solution | 16.6.0 |
| 2020-09 | SA#89-e | SP-200729 | 0336 | - | F | Add missing definitions for perfReq | 16.6.0 |
| 2020-09 | SA#89-e | SP-200754 | 0338 | 1 | F | Delete supportedAccessTech to align with GST | 16.6.0 |
| 2020-09 | SA#89-e | SP-200724 | 0339 | - | F | Correction on duplicated annex numbering | 16.6.0 |
| 2020-09 | SA#89-e | SP-200729 | 0345 | - | F | Update NRM attribute definitions | 16.6.0 |
| 2020-09 | SA#89-e | SP-200749 | 0362 | - | F | Deleting SupportedAccessTech - Stage 3 - XML | 16.6.0 |
| 2020-09 | SA#89-e | SP-200724 | 0368 | 1 | F | Add relation between transport and application level endpoints | 16.6.0 |
| 2020-09 | SA#89-e | SP-200724 | 0369 | - | F | Add relation between transport and application level endpoints stage 3 | 16.6.0 |
| 2020-09 | SA#89-e | SP-200729 | 0370 | 1 | F | Cleanup stage 2 editorial issue and stage 3 yaml error | 16.6.0 |
| 2020-09 | SA#89-e | SP-200749 | 0371 | - | F | Add clarifying note to ServiceProfile | 16.6.0 |
| 2020-11 |  |  |  |  |  | No technical changes, cleanup of watermarks, hidden text and custom XMl, etc | 16.6.1 |
| 2020-11 |  |  |  |  |  | Some code was changed by mistake in the previous version. These changes have been reverted. | 16.6.2 |
| 2020-12 | SA#90e | SP-201057 | 0377 | - | F | Correction of NRM YANG errors | 16.7.0 |
| 2020-12 | SA#90e | SP-201045 | 0378 | - | F | Add subclause reference of MRO related attribute | 16.7.0 |
| 2020-12 | SA#90e | SP-201057 | 0379 | - | F | Correct the definition for configurable5QI and dynamic5QI | 16.7.0 |
| 2020-12 | SA#90e | SP-201045 | 0381 | 1 | F | Change RACH control attributes from beam to cell | 16.7.0 |
| 2020-12 | SA#90e | SP-201045 | 0383 | 1 | F | Move Distributed RACH control IOC from CU to DU | 16.7.0 |
| 2020-12 | SA#90e | SP-201045 | 0385 | 2 | F | Move Distributed PCI control IOC from DU to CU | 16.7.0 |
| 2020-12 | SA#90e | SP-201057 | 0389 | - | F | Correction of cell neighbour relations related attributes in openAPI solution | 16.7.0 |
| 2020-12 | SA#90e | SP-201057 | 0394 | 1 | F | Correct Network slice NRM | 16.7.0 |
| 2020-12 | SA#90e | SP-201050 | 0398 | - | F | Add containment relationship for network slice IOCs | 16.7.0 |
| 2020-12 | SA#90e | SP-201050 | 0400 | - | F | Add containment relationship for network slice IOCs stage 3 | 16.7.0 |
| 2020-12 | SA#90e | SP-201053 | 0408 | - | F | Fix description related to service profile | 16.7.0 |
| 2020-12 | SA#90e | SP-201089 | 0409 | 1 | F | Correction of NRM YANG errors | 16.7.0 |
| 2020-12 | SA#90e | SP-201089 | 0411 | - | F | YANG improvements | 16.7.0 |
| 2020-12 | SA#90e | SP-201056 | 0413 | - | F | Add serviceProfileId and sliceProfileId to stage 3 yaml | 16.7.0 |
| 2020-12 | SA#90e | SP-201089 | 0418 | - | F | Update notifyThresholdCrossing to be a common notification. | 16.7.0 |
| 2020-12 | SA#90e | SP-201089 | 0420 | - | F | pLMNInfoList faulty attribute definition | 16.7.0 |
| 2020-12 | SA#90e | SP-201089 | 0422 | - | F | Fix containment relationship for EP\_Transport IOC | 16.7.0 |
| 2021-03 | SA#91e | SP-210153 | 0429 | 4 | F | Correction of ServiceProfile attributes | 16.8.0 |
| 2021-03 | SA#91e | SP-210153 | 0431 | 1 | F | Correction on Dynamic5QISet IOC based on LS reply from SA2 | 16.8.0 |
| 2021-03 | SA#91e | SP-210154 | 0434 | 3 | F | Correct the NF name in definition of EP\_NgU | 16.8.0 |
| 2021-03 | SA#91e | SP-210153 | 0439 | - | F | Add missing inheritance description information in the attribute definition for several IOCs | 16.8.0 |
| 2021-03 | SA#91e | SP-210153 | 0441 | 2 | F | Correct multiplicity issue for several attributes of NR NRM | 16.8.0 |
| 2021-03 | SA#91e | SP-210146 | 0444 | 2 | F | Fix containment relationship for EP\_Transport IOC | 16.8.0 |
| 2021-03 | SA#91e | SP-210143 | 0460 | 1 | F | Update of the PCI and DESManagementFunction | 16.8.0 |
| 2021-03 | SA#91e | SP-210154 | 0466 | 1 | A | Correction to NSI and NSSI state management | 16.8.0 |
| 2021-03 | SA#91e | SP-210143 | 0471 | - | F | YANG compilation error and missing stage 2 corrections | 16.8.0 |
| 2021-03 | SA#91e | SP-210146 | 0473 | - | F | Fix compilation and other errors | 16.8.0 |
| 2021-06 | SA#92e | SP-210411 | 0477 | - | F | Yang Corrections of implementation errors | 16.9.0 |
| 2021-06 | SA#92e | SP-210411 | 0489 | - | F | Correct the description for GNBDUFunction and EP\_NgC | 16.9.0 |
| 2021-06 | SA#92e | SP-210406 | 0500 | 1 | F | Fix editorial issue of network slice NRM | 16.9.0 |
| 2021-06 | SA#92e | SP-210406 | 0502 | 1 | F | fix inheritance relation of network slice NRM | 16.9.0 |
| 2021-06 | SA#92e | SP-210411 | 0509 | - | F | Correct inconsistencies in definitions around network slice management | 16.9.0 |
| 2021-06 | SA#92e | SP-210406 | 0513 | 1 | F | Correction to definition for domain centralized SON | 16.9.0 |
| 2021-06 | SA#92e | SP-210590 | 0516 | - | F | Fix conflict of stage 3 OpenAPI code | 16.9.0 |
| 2021-09 | SA#93e | SP-210871 | 0517 |  |  | YANG NR-NRM model structure repair and cleanup | 16.10.0 |
| 2021-09 | SA#93e | SP-210885 | 0521 | - | F | Deprecate Top-Attr and use Top instead | 16.10.0 |
| 2021-09 | SA#93e | SP-210885 | 0523 | - | F | Fix incorrect attributes inheritance description | 16.10.0 |
| 2021-09 | SA#93e | SP-210871 | 0529 | - | F | Remove the attribute definition which is not used | 16.10.0 |
| 2021-09 | SA#93e | SP-210871 | 0533 | 1 | F | Fix the issue caused by the updated NetworkSliceSubnet inheritence relationship | 16.10.0 |
| 2021-09 | SA#93e | SP-210871 | 0544 | - | F | Correction for attribute description of servAttrCom | 16.10.0 |
| 2021-09 | SA#93e | SP-210871 | 0546 | - | F | Correction of YAML references | 16.10.0 |
| 2021-09 | SA#93e | SP-210885 | 0552 | - | F | Remove isINEF attribute from NEFFunction IOC | 16.10.0 |
| 2021-09 | SA#93e | SP-210871 | 0553 | - | F | YANG updates to correct YANG merging problems | 16.10.0 |
| 2021-09 | SA#93e | SP-210871 | 0561 | - | F | Moving RIM monitoring related attributes to NRCellDU | 16.10.0 |
| 2021-09 | SA#93e | SP-210885 | 0565 | 1 | F | Fix inconsistent clauses and attributes used in TS 38.211 and TS 28.541 | 16.10.0 |
| 2021-12 | SA#94e | SP-211472 | 0570 | - | F | Align different (abbreviated) names for support qualifier to S | 16.11.0 |
| 2021-12 | SA#94e | SP-211454 | 0572 | 1 | F | Correct Class diagram of AMF Region/AMF Set and stage 3 implementation | 16.11.0 |
| 2021-12 | SA#94e | SP-211454 | 0574 | 1 | F | Clarify the usage of pLMNId in first entry in pLMNInfoList | 16.11.0 |
| 2021-12 | SA#94e | SP-211454 | 0588 | 1 | F | cNSIId description clarification | 16.11.0 |
| 2021-12 | SA#94e | SP-211462 | 0594 | 1 | F | DMRO correction | 16.11.0 |
| 2021-12 | SA#94e | SP-211454 | 0603 | - | F | Correct PLMNInfo support qualifier | 16.11.0 |
| 2021-12 | SA#94e | SP-211464 | 0605 | 1 | F | Clarify tenant relationship with ServiceProfileId | 16.11.0 |
| 2021-12 | SA#94e | SP-211475 | 0620 | - | F | Correct the wrong reference for TS 32.160 | 16.11.0 |
| 2021-12 | SA#94e | SP-211472 | 0623 | - | F | Rel-16 Fix stage3 definition for plmnId | 16.11.0 |
| 2021-12 | SA#94e | SP-211472 | 0640 | - | F | Correct spelling of Attribute properties | 16.11.0 |
| 2022-03 | SA#95e | SP-220179 | 0654 | - | F | Remove incorrect reference to TS 22.104 | 16.12.0 |
| 2022-03 | SA#95e | SP-220179 | 0677 | - | F | Correct YANG mapping in TS document | 16.12.0 |
| 2022-03 | SA#95e |  |  |  |  | Correct document header and History table | 16.12.1 |
| 2022-03 | SA#95e |  |  |  |  | Removal of comments in the document | 16.12.2 |
| 2022-06 | SA#96 | SP-220497 | 0684 | - | F | Diagram fix for NRM fragment for RRM policies | 16.13.0 |
| 2022-06 | SA#96 | SP-220497 | 0686 | - | F | Fixing OpenAPI Discoverability issue in stage 3-5gcNrm.yaml | 16.13.0 |
| 2022-06 | SA#96 | SP-220497 | 0687 | - | F | Fixing OpenAPI Discoverability issue in stage 3- nrNrm.yaml | 16.13.0 |
| 2022-06 | SA#96 | SP-220497 | 0688 | - | F | Fixing OpenAPI Discoverability issue in Stage3-sliceNrm.yaml | 16.13.0 |
| 2022-06 | SA#96 | SP-220498 | 0692 | - | F | CT OpenAPI file relative-path URI references and dependence change for 5gcNrm.yaml | 16.13.0 |
| 2022-06 | SA#96 | SP-220498 | 0695 | 1 | F | OpenAPI file name and dependence change for 5gcNrm.yaml | 16.13.0 |
| 2022-06 | SA#96 | SP-220498 | 0696 | 1 | F | OpenAPI file name and dependence change for nrNrm.yaml | 16.13.0 |
| 2022-06 | SA#96 | SP-220498 | 0697 | 1 | F | OpenAPI file name and dependence change for sliceNrm.yaml | 16.13.0 |
| 2022-06 | SA#96 | SP-220498 | 0701 | - | F | Correction to RRMPolicy\_ IOC reference in RRMPolicyRatio IOC | 16.13.0 |
| 2022-06 | SA#96 | SP-220498 | 0703 | - | F | Add attribute properties for NetworkSliceSubnet attribute priorityLabel | 16.13.0 |
| 2022-06 | SA#96 | SP-220498 | 0709 | 1 | F | Correct isOrdered-isUnique for multivalue attributes | 16.13.0 |
| 2022-06 | SA#96 | SP-220510 | 0718 | - | F | Correction on minor errors in nrNRM.yaml | 16.13.0 |
| 2022-06 | SA#96 | SP-220510 | 0720 | - | F | Correction on the attribution definition in the wrong yaml file | 16.13.0 |
| 2022-06 | SA#96 | SP-220510 | 0726 |  | F | Fix BWP association in NRCellDU | 16.13.0 |
| 2022-06 | SA#96 | SP-220510 | 0728 | - | F | Update 5QI set reference attribute definition | 16.13.0 |
| 2022-06 | SA#96 | SP-220510 | 0730 | - | F | Update 5QI set description - YANG module | 16.13.0 |
| 2023-01 | SA#98e | SP-221169 | 0794 | 1 | F | Correcting name of nSInstanceId | 16.14.0 |
| 2023-01 | SA#98e | SP-221169 | 0801 | 2 | F | Correction to multiplicity of relation between NetworkSlice IOC and NetworkSliceSubnet IOC | 16.14.0 |
| 2023-01 | SA#98e | SP-221169 | 0804 | - | F | Correction to GSMA NG 116 reference for KPIMonitoring | 16.14.0 |
| 2023-01 | SA#98e | SP-221169 | 0807 | - | F | Correction to ServiceProfile attribute v2XCommModels name in YAML defintion | 16.14.0 |
| 2023-01 | SA#98e | SP-221169 | 0810 | - | F | Correction to inconsistencies in GNBCUCPFunction definition | 16.14.0 |
| 2023-01 | SA#98e | SP-221173 | 0814 | 1 | A | Adding YANG begin and End markers | 16.14.0 |
| 2023-01 | SA#98e | SP-221182 | 0836 | - | F | Consistency in use of servAttrCom --> non implemented, CR incorrect | 16.14.0 |
| 2023-01 | SA#98e | SP-221182 | 0839 | 1 | F | Correct kPIList | 16.14.0 |
| 2023-01 | SA#98e | SP-221182 | 0842 | 2 | F | Correct periodicityList | 16.14.0 |
| 2023-01 | SA#98e |  |  |  |  | Adding a return in annex E.5.7 (implementation mistake) | 16.14.1 |
| 2023-03 | SA#99 | SP-230199 | 0865 | - | F | Remove redundant stage 3 definition for Mnc and PlmnId | 16.15.0 |
| 2023-03 | SA#99 | SP-230200 | 0879 | 1 | A | Clarify Monut information clauses | 16.15.0 |
| 2023-04 | SA#99 |  |  |  |  | Adding missing YAML files in the zip | 16.15.1 |
| 2023-05 | SA#99 |  |  |  |  | Fixing Foreword clause title | 16.15.2 |
| 2023-06 | SA#100 | SP-230648 | 0901 | 1 | F | Correction to multiplicity definition to nRPciList and stage 3 implementation of both NRPciList and CSonPciList | 16.16.0 |
| 2023-06 | SA#100 | SP-230648 | 0906 | 1 | F | Clean up of incorrect use of multiplicity isOrdered isUnique and isNullable in attribute properties table | 16.16.0 |
| 2023-09 | SA#101 | SP-230964 | 0940 | 1 | F | Correct attribute name for indication of v2XCommMode | 16.17.0 |
| 2023-09 | SA#101 | SP-230964 | 0948 | 1 | F | Update Annex L with mapping table | 16.17.0 |
| 2023-09 | SA#101 | SP-230941 | 0953 | 1 | F | Correction to type defintion of coverageAreaTAList | 16.17.0 |
| 2023-09 | SA#101 | SP-230941 | 0967 | 1 | F | Removing redundant Tai definition in NR NRM | 16.17.0 |
| 2023-09 | SA#101 | SP-230941 | 0971 | 1 | F | Fix small inconsistent issues in stage2, typo in stage 2 and 3 | 16.17.0 |
| 2023-09 | SA#101 | SP-230941 | 0974 | 2 | F | Fix a few inheritance diagram issues in NR NRM | 16.17.0 |
| 2023-09 | SA#101 | SP-230941 | 0977 | 1 | F | Update RRMPolicyRatio | 16.17.0 |
| 2023-09 | SA#101 | SP-230941 | 0982 | - | F | Remove duplicated notifications | 16.17.0 |
| 2023-09 | SA#101 | SP-230958 | 0987 | 1 | F | Correct the issues for the attribute with the ENUM type for network slicing NRM fragment | 16.17.0 |
| 2023-09 | SA#101 | SP-230941 | 0995 | 1 | F | Correction on DeterministicComm data type | 16.17.0 |