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TECHNICAL SPECIFICATION

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Stage 3  
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**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B  
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# Foreword

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

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

- shall** indicates a mandatory requirement to do something
- shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

- should** indicates a recommendation to do something
- should not** indicates a recommendation not to do something
- may** indicates permission to do something
- need not** indicates permission not to do something

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

- can** indicates that something is possible
- cannot** indicates that something is impossible

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

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

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

In addition:

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

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

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

---

# 1 Scope

The present document specifies the stage 3 protocol and data model for common data types that are used or may be expected to be used by multiple Service Based Interface APIs supported by the same or different Network Function(s).

The Principles and Guidelines for Services Definition are specified in 3GPP TS 29.501 [2].

---

# 2 References

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

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

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".
- [3] OpenAPI: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0>.
- [4] IETF RFC 1166: "Internet Numbers".
- [5] IETF RFC 5952: "A recommendation for IPv6 address text representation".
- [6] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".
- [7] 3GPP TS 23.003: "Numbering, addressing and identification".
- [8] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".
- [9] IETF RFC 9457: "Problem Details for HTTP APIs".
- [10] IETF RFC 3339: "Date and Time on the Internet: Timestamps".
- [11] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP) ".
- [12] IETF RFC 6901: "JavaScript Object Notation (JSON) Pointer".
- [13] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".
- [14] IETF RFC 6902: "JavaScript Object Notation (JSON) Patch".
- [15] IETF RFC 9562: "Universally Unique Identifier (UUID)".
- [16] 3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)".
- [17] IETF RFC 7042: "IANA Considerations and IETF Protocol and Documentation Usage for IEEE 802 Parameters".
- [18] IETF RFC 6733: "Diameter Base Protocol".
- [19] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".
- [20] 3GPP TS 24.501: "Non-Access-Stratum (NAS) Protocol for 5G System (5GS); Stage 3".

- [21] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".
- [22] Void.
- [23] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".
- [24] ITU-T Recommendation Q.763 (1999): "Specifications of Signalling System No.7; Formats and codes".
- [25] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".
- [26] 3GPP TS 23.015: "Technical Realization of Operator Determined Barring".
- [27] 3GPP TR 21.900: "Technical Specification Group working methods".
- [28] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".
- [29] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".
- [30] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".
- [31] IEEE Std 802.11-2012: "IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".
- [32] CableLabs WR-TR-5WWC-ARCH: "5G Wireless Wireline Converged Core Architecture".
- [33] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access; Stage 2".
- [34] BBF TR-069: "CPE WAN Management Protocol".
- [35] BBF TR-369: "User Services Platform (USP)".
- [36] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services".
- [37] BBF TR-470: "5G Wireless Wireline Convergence Architecture".
- [38] IEEE "Guidelines for Use of Extended Unique Identifier (EUI), Organizationally Unique Identifier (OUI), and Company ID (CID)", <https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/tutorials/eui.pdf>
- [39] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".
- [40] IETF RFC 5580: "Carrying Location Objects in RADIUS and Diameter".
- [41] BBF TR-456: "AGF Functional Requirements".
- [42] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".
- [43] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3".
- [44] ECMA-262: "ECMAScript® Language Specification", <https://www.ecma-international.org/ecma-262/5.1/>.
- [45] 3GPP TS 33.246: "Security of Multimedia Broadcast/Multicast Service (MBMS)".
- [46] 3GPP TS 33.501: "Security architecture and procedures for 5G system; Stage 2".
- [47] IETF RFC 7542: "The Network Access Identifier".
- [48] 3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".
- [49] 3GPP TS 23.558: "Architecture for enabling Edge Applications (EA)".

- [50] 3GPP TS 33.503: "Security Aspects of Proximity based Services (ProSe) in the 5G System (5GS)".
- [51] IEEE Std 1588: "IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems", Edition 2019.
- [52] 3GPP TS 29.573: "5G System: Public Land Mobile Network (PLMN) Interconnection; Stage 3".
- [53] IETF RFC 8122: "Connection-Oriented Media Transport over the Transport Layer Security (TLS) Protocol in the Session Description Protocol (SDP)".
- [54] IETF RFC 8842: "Session Description Protocol (SDP) Offer/Answer Considerations for Datagram Transport Layer Security (DTLS) and Transport Layer Security (TLS)".
- [55] IETF RFC 8841: "Session Description Protocol (SDP) Offer/Answer Procedures for Stream Control Transmission Protocol (SCTP) over Datagram Transport Layer Security (DTLS) Transport".
- [56] 3GPP TS 28.405: "Telecommunication management; Quality of Experience (QoE) measurement collection; Control and configuration".
- [57] 3GPP TS 24.554: "Proximity-services (ProSe) in 5G System (5GS) protocol aspects; Stage 3".
- [58] 3GPP TS 32.255: "Charging management; 5G data connectivity domain charging; stage 2".
- [59] 3GPP TS 26.522: "5G Real-time Media Transport Protocol Configurations".
- [60] IETF RFC 8285: "A General Mechanism for RTP Header Extensions".
- [61] IETF RFC 3550: "RTP: A Transport Protocol for Real-Time Applications".
- [62] IETF RFC 3711: "The Secure Real-time Transport Protocol (SRTP)".
- [63] IETF RFC 6184: "RTP Payload Format for H.264 Video".
- [64] IETF RFC 7798: "RTP Payload Format for High Efficiency Video Coding (HEVC) ".
- [65] 3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities".
- [66] 3GPP TS 28.558: "Management and orchestration; User Equipment (UE) level measurements for 5G system".
- [67] IETF draft-ietf-moq-transport: "Media over QUIC Transport".

**Editor's note:** The above reference will be revised to RFC when finalized by IETF.

- [68] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".
- [69] IETF RFC 5357: "A Two-Way Active Measurement Protocol (TWAMP)".
- [70] IETF RFC 4656: "A One-way Active Measurement Protocol (OWAMP)".
- [71] IETF RFC 8762: "Simple Two-Way Active Measurement Protocol".
- [72] 3GPP TS 23.247: "Architectural enhancements for 5G multicast-broadcast services".
- [73] 3GPP TS 38.300: "NR; Overall description; Stage-2".
- [74] 3GPP TS 29.122: "T8 reference point for Northbound APIs".
- [75] IETF RFC 9796: "SIP Call-Info Parameters for Rich Call Data".
- [76] IETF RFC 6350: "vCard Format Specification".
- [77] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".
- [78] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".

---

## 3 Definitions and abbreviations

### 3.1 Definitions

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

### 3.2 Abbreviations

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

5GC	5G Core Network
AIoT	Ambient IoT
DNAI	Data Network Access Identifier
eRedCap UE	a UE with enhanced reduced capabilities as specified in clause 4.2.22.1 in 3GPP TS 38.306 [65].
EUI	Extended Unique Identifier
GEO	Geosynchronous Orbit
GPSI	Generic Public Subscription Identifier
GUAMI	Globally Unique AMF Identifier
HFC	Hybrid Fiber Coax
LEO	Low Earth Orbit
MEO	Medium Earth Orbit
N5GC	Non-5G Capable
NSSAA	Network Slice- Specific Authentication and Authorization
NTN	Non-Terrestrial Network
PEI	Permanent Equipment Identifier
RedCap UE	a UE with reduced capabilities as specified in clause 4.2.21.1 in 3GPP TS 38.306 [65].
SBI	Service Based Interface
SUPI	Subscription Permanent Identifier
UAV	Uncrewed Aerial Vehicle

---

## 4 Overview

For the different 5GC SBI API, data types shall be defined. Data types identified as common data types shall be defined in this Technical specification and should be referenced from individual 5GC SBI API specifications.

Data types applicable or intended to be applicable to several 5GC SBI API specifications should be interpreted as common data types.

---

## 5 Common Data Types

### 5.1 Introduction

In the following clauses, common data types for the following areas are defined:

- Data types for generic usage;
- Data types for Subscription, Identification and Numbering;

- Data types related to 5G Network;
- Data types related to 5G QoS;
- Data types related to 5G Trace;
- Data types related to 5G ODBs.

## 5.2 Data Types for Generic Usage

### 5.2.1 Introduction

This clause defines common data types for generic usage.

#### 5.2.1A Re-used Data Types

This clause specifies the re-used data types from other specifications.

**Table 5.2.1A-1: Re-used Data Types**

Data Type	Reference	Comments
NFType	3GPP TS 29.510 [29]	
ServiceName	3GPP TS 29.510 [29]	
DataSetId	3GPP TS 29.510 [29]	
PlmnSnssai	3GPP TS 29.510 [29]	
GeographicArea	3GPP TS 29.572 [43]	
CivicAddress	3GPP TS 29.572 [43]	
NoProfileMatchInfo	3GPP TS 29.510 [29]	
ValidTimePeriod	3GPP TS 29.503 [68]	
TimeWindow	3GPP TS 29.122 [74]	Time Window

### 5.2.2 Simple Data Types

This clause specifies common simple data types.

**Table 5.2.2-1: Simple Data Types**

Type Name	Type Definition	Description
Binary	string	String with format "binary" as defined in OpenAPI Specification [3]
BinaryRm	string	This data type is defined in the same way as the "Binary" data type, but with the OpenAPI "nullable: true" property.
Bytes	string	String with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters.
BytesRm	string	This data type is defined in the same way as the "Bytes" data type, but with the OpenAPI "nullable: true" property.
Date	string	String with format "date" as defined in OpenAPI Specification [3]
DateRm	string	This data type is defined in the same way as the "Date" data type, but with the OpenAPI "nullable: true" property.
DateTime	string	String with format "date-time" as defined in OpenAPI Specification [3]
DateTimeRm	string	This data type is defined in the same way as the "DateTime" data type, but with the OpenAPI "nullable: true" property.
DiameterIdentity	Fqdn	String containing a Diameter Identity (FQDN), according to clause 4.3 of IETF RFC 6733 [18]. DiameterIdentity is defined as a simple data type because Fqdn is also a simple data type (string).
DiameterIdentityRm	FqdnRm	This data type is defined in the same way as the "DiameterIdentity" data type, but with the OpenAPI "nullable: true" property. DiameterIdentityRm is defined as a simple data type because FqdnRm is also a simple data type (either a string or null).
Double	number	Number with format "double" as defined in OpenAPI Specification [3]
DoubleRm	number	This data type is defined in the same way as the "Double" data type, but with the OpenAPI "nullable: true" property.
DurationSec	integer	Unsigned integer identifying a period of time in units of seconds.
DurationSecRm	integer	This data type is defined in the same way as the "DurationSec" data type, but with the OpenAPI "nullable: true" property.
Float	number	Number with format "float" as defined in OpenAPI Specification [3]
FloatRm	number	This data type is defined in the same way as the "Float" data type, but with the OpenAPI "nullable: true" property.
Uint16	integer	Integer where the allowed values correspond to the value range of an unsigned 16-bit integer, i.e. 0 to 65535. Minimum = 0. Maximum = 65535.
Uint16Rm	integer	This data type is defined in the same way as the "Uint16" data type, but with the OpenAPI "nullable: true" property.
Int32	integer	Integer with format "int32" as defined in OpenAPI Specification [3]
Int32Rm	integer	This data type is defined in the same way as the "Int32" data type, but with the OpenAPI "nullable: true" property.
Int64	integer	Integer with format "int64" as defined in OpenAPI Specification [3]
Int64Rm	integer	This data type is defined in the same way as the "Int64" data type, but with the OpenAPI "nullable: true" property.
Ipv4Addr	string	String identifying a IPv4 address formatted in the "dotted decimal" notation as defined in IETF RFC 1166 [4]. Pattern: '^(([0-9] [1-9][0-9] 1[0-9][0-9] 2[0-4][0-9] 25[0-5])\.){3}([0-9] [1-9][0-9] 1[0-9][0-9] 2[0-4][0-9] 25[0-5])\$'
Ipv4AddrRm	string	This data type is defined in the same way as the "Ipv4Addr" data type, but with the OpenAPI "nullable: true" property.
Ipv4AddrMask	string	String identifying a IPv4 address mask formatted in the "dotted decimal" notation as defined in IETF RFC 1166 [4]. Pattern: '^(([0-9] [1-9][0-9] 1[0-9][0-9] 2[0-4][0-9] 25[0-5])\.){3}([0-9] [1-9][0-9] 1[0-9][0-9] 2[0-4][0-9] 25[0-5])(V([0-9] [1-2][0-9] 3[0-2]))\$'
Ipv4AddrMaskRm	string	This data type is defined in the same way as the "Ipv4AddrMask" data type, but with the OpenAPI "nullable: true" property.
Ipv6Addr	string	String identifying an IPv6 address formatted according to clause 4 of IETF RFC 5952 [5]. The mixed IPv4 IPv6 notation according to clause 5 of IETF RFC 5952 [5] shall not be used. Pattern: '^(: :([1-9a-f]{0,3})):(0? ([1-9a-f]{0,3}-f){0,3}):{0,6}(: :([1-9a-f]{0,3}))\$' and Pattern: '^((([:+]{7} [[:+]] ([[:+]]*[:+]?::([[:+]]*[:+]?)))\$'

Ipv6AddrRm	string	This data type is defined in the same way as the "Ipv6Addr" data type, but with the OpenAPI "nullable: true" property.
Ipv6Prefix	string	String identifying an IPv6 address prefix formatted according to clause 4 of IETF RFC 5952 [5]. IPv6Prefix data type may contain an individual /128 IPv6 address. Pattern: '^(: (0? [1-9a-f][0-9a-f]{0,3}))*((0? [1-9a-f][0-9a-f]{0,3}))*{0,6}(: (0? [1-9a-f][0-9a-f]{0,3}))*(\v ([0-9])([0-9]{2})(1[0-1][0-9])(12[0-8]))\$' and Pattern: '^((([^\:]+){7}([^\:]+))((( [^\:]+)*[^\:]+)?::([^\:]+)*[^\:]+?))(\v.+)\$'
Ipv6PrefixRm	string	This data type is defined in the same way as the "Ipv6Prefix" data type, but with the OpenAPI "nullable: true" property.
MacAddr48	string	String identifying a MAC address formatted in the hexadecimal notation according to clause 1.1 and clause 2.1 of IETF RFC 7042 [17]. Pattern: '^([0-9a-fA-F]{2})(-[0-9a-fA-F]{2}){5}\$'
MacAddr48Rm	string	This data type is defined in the same way as the "MacAddr48" data type, but with the OpenAPI "nullable: true" property.
SupportedFeatures	string	A string used to indicate the features supported by an API that is used as defined in clause 6.6 in 3GPP TS 29.500 [25]. The string shall contain a bitmask indicating supported features in hexadecimal representation: Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent the support of 4 features as described in table 5.2.2-3. The most significant character representing the highest-numbered features shall appear first in the string, and the character representing features 1 to 4 shall appear last in the string. The list of features and their numbering (starting with 1) are defined separately for each API. If the string contains a lower number of characters than there are defined features for an API, all features that would be represented by characters that are not present in the string are not supported.
UInteger	integer	Unsigned Integer, i.e. only value 0 and integers above 0 are permissible. Minimum = 0.
UIntegerRm	integer	This data type is defined in the same way as the "UInteger" data type, but with the OpenAPI "nullable: true" property.
Uint32	integer	Integer where the allowed values correspond to the value range of an unsigned 32-bit integer, i.e. 0 to (2 <sup>32</sup> )-1. Minimum = 0. Maximum = 4294967295.
Uint32Rm	integer	This data type is defined in the same way as the "Uint32" data type, but with the OpenAPI "nullable: true" property.
Uint64	integer	Integer where the allowed values correspond to the value range of an unsigned 64-bit integer, i.e. 0 to (2 <sup>64</sup> )-1. Minimum = 0. Maximum = 18446744073709551615.
Uint64Rm	integer	This data type is defined in the same way as the "Uint64" data type, but with the OpenAPI "nullable: true" property.
Uri	string	String providing an URI formatted according to IETF RFC 3986 [6]. If the URI fields intended to convey generic data (e.g., in the value part of a query parameter, or in the URI path segments) contain reserved characters, these reserved characters shall be percent-encoded as defined in clause 5.2.10.2 of 3GPP TS 29.500 [25].
UriRm	string	This data type is defined in the same way as the "Uri" data type, but with the OpenAPI "nullable: true" property.
VarUeld	string	String represents the SUPI or GPSI. Pattern: "^(imsi-[0-9]{5,15} nai-.\+ msisdn-[0-9]{5,15} extid-[^\@]+\@[^\@]+\+ gci-.\+ gli-.\+)\$"
VarUeldRm	string	This data type is defined in the same way as the "VarUeld" data type, but with the OpenAPI "nullable: true" property.

TimeZone	string	String with format "<time-numoffset>" optionally appended by "<daylightSavingTime>", where:  - <time-numoffset> shall represent the time zone adjusted for daylight saving time and be encoded as time-numoffset as defined in clause 5.6 of IETF RFC 3339 [10];  - <daylightSavingTime> shall represent the adjustment that has been made and shall be encoded as "+1" or "+2" for a +1 or +2 hours adjustment.  Example: "-08:00+1" (for 8 hours behind UTC, +1 hour adjustment for Daylight Saving Time).
TimeZoneRm	string	This data type is defined in the same way as the "TimeZone" data type, but with the OpenAPI "nullable: true" property.
StnSr	string	String representing the STN-SR as defined in clause 18.6 of 3GPP TS 23.003 [7].
StnSrRm	string	This data type is defined in the same way as the "StnSr" data type, but with the OpenAPI "nullable: true" property.
CMSisdn	string	String representing the C-MSISDN as defined in clause 18.7 of 3GPP TS 23.003 [7]. Pattern: "^[0-9]{5,15}\$".
CMSisdnRm	string	This data type is defined in the same way as the "CMSisdn" data type, but with the OpenAPI "nullable: true" property.
MonthOfYear	integer	Integer between and including 1 and 12 denoting a month. "1" shall indicate "January", and the subsequent months shall be indicated with the next higher numbers. "12" shall indicate "December".
DayOfWeek	integer	Integer between and including 1 and 7 denoting a weekday. "1" shall indicate "Monday", and the subsequent weekdays shall be indicated with the next higher numbers. "7" shall indicate "Sunday".
TimeOfDay	string	String with format "partial-time" or "full-time" as defined in clause 5.6 of IETF RFC 3339 [10]. Examples: "20:15:00", "20:15:00-08:00" (for 8 hours behind UTC).
EmptyObject	object	Empty JSON object: { } It is defined with the keyword: "additionalProperties: false".
Fqdn	string	Fully Qualified Domain Name  Pattern: '^([0-9A-Za-z]([0-9A-Za-z]{0,61}[0-9A-Za-z])?\.)+[A-Za-z]{2,63}\.?\$'  minLength: 4 maxLength: 253  As specified for FQDNs in 3GPP TS 23.003 [7], clause 19.4.2.1, FQDNs shall be handled as case-insensitive strings.
FqdnRm	string	This data type is defined in the same way as the "Fqdn" data type, but it also allows the null value.

Table 5.2.2-2: Reused OpenAPI data types

Type Name	Description
boolean	As defined in OpenAPI Specification [3]
integer	As defined in OpenAPI Specification [3]
number	As defined in OpenAPI Specification [3]
string	As defined in OpenAPI Specification [3]
object	As defined in OpenAPI Specification [3]
array	As defined in OpenAPI Specification [3]
NOTE	Data types defined in OpenAPI Specification [3] do not follow the UpperCamel convention for data types in 3GPP TS 29.501 [2]

**Table 5.2.2-3: Meaning of a Hexadecimal Character in SupportedFeatures Type**

Character	Feature n+3 supported	Feature n+2 supported	Feature n+1 supported	Feature n supported
"0"	no	no	no	no
"1"	no	no	no	yes
"2"	no	no	yes	no
"3"	no	no	yes	yes
"4"	no	yes	no	no
"5"	no	yes	no	yes
"6"	no	yes	yes	no
"7"	no	yes	yes	yes
"8"	yes	no	no	no
"9"	yes	no	no	yes
"A"	yes	no	yes	no
"B"	yes	no	yes	yes
"C"	yes	yes	no	no
"D"	yes	yes	no	yes
"E"	yes	yes	yes	no
"F"	yes	yes	yes	yes

NOTE 1 "n" shall be  $i * 4 + 1$ , where "i" is zero or a natural number, i.e permissible values of "n" are 1, 5, 9, ...

NOTE 2 In this table if a feature is not defined, it shall also be indicated with value "no".

For example, if only the first feature defined in the feature list is set to 1, the corresponding SupportedFeatures attribute would have a hexadecimal character value of "1", or a string of hexadecimal characters with value of "001" (any amount of 0's to the left of the 1 would result into an equivalent feature list). If we have 32 features defined, and only the last feature in a feature list is set to 1, the corresponding SupportedFeatures attribute would have a string of hexadecimal characters with value of "80000000" (see the description of the SupportedFeatures encoding in Table 5.2.2-1).

## 5.2.3 Enumerations

### 5.2.3.1 Enumeration: PatchOperation

**Table 5.2.3.1-1: Enumeration PatchOperation**

Enumeration value	Description
"add"	Add operation as defined in IETF RFC 6902 [14].
"copy"	Copy operation as defined in IETF RFC 6902 [14].
"move"	Move operation as defined in IETF RFC 6902 [14].
"remove"	Remove operation as defined in IETF RFC 6902 [14].
"replace"	Replace operation as defined in IETF RFC 6902 [14].
"test"	Test operation as defined in IETF RFC 6902 [14].

### 5.2.3.2 Enumeration: UriScheme

**Table 5.2.3.2-1: Enumeration UriScheme**

Enumeration value	Description
"http"	HTTP URI scheme
"https"	HTTPS URI scheme

5.2.3.3 Enumeration: ChangeType

**Table 5.2.3.3-1: Enumeration ChangeType**

Enumeration value	Description
"ADD"	<p>This value indicates new attribute has been added to the resource. The "ADD" operation performs one of the following functions, depending upon what the target location references:</p> <ul style="list-style-type: none"> <li>-If the target location specifies an array index, a new value is inserted into the array at the specified index.</li> <li>-If the target location specifies an object member that does not already exist, a new member is added to the object.</li> <li>-If the target location specifies an object member that does exist, that member's value is replaced.</li> </ul> <p>The operation object shall contain a "value" member whose content specifies the value to be added. For example:</p> <pre>{ "op": "ADD", "path": "/a/b/c", "value": [ "foo", "bar" ] }</pre> <p>When the operation is applied, the target location shall reference one of:</p> <ul style="list-style-type: none"> <li>-The root of the target document - whereupon the specified value becomes the entire content of the target document.</li> <li>-A member to add to an existing object - whereupon the supplied value is added to that object at the indicated location. If the member already exists, it is replaced by the specified value.</li> <li>-An element to add to an existing array - whereupon the supplied value is added to the array at the indicated location. Any elements at or above the specified index are shifted one position to the right. The specified index shall not be greater than the number of elements in the array. If the "-" character is used to index the end of the array (see IETF RFC 6901 [12]), this has the effect of appending the value to the array.</li> </ul> <p>Because this operation is designed to add to existing objects and arrays, its target location will often not exist. Although the pointer's error handling algorithm will thus be invoked, this specification defines the error handling behavior for "ADD" pointers to ignore that error and add the value as specified.</p> <p>However, the object itself or an array containing it does need to exist, and it remains an error for that not to be the case. For example, an "ADD" with a target location of "/a/b" starting with this document:</p> <pre>{ "a": { "foo": 1 } }</pre> <p>is not an error, because "a" exists, and "b" will be added to its value. It is an error in this document:</p> <pre>{ "q": { "bar": 2 } }</pre> <p>because "a" does not exist.</p>

"MOVE"	<p>This value indicates existing attribute has been moved to a different path in the resource. The "MOVE" operation removes the value at a specified location and adds it to the target location.</p> <p>The operation object shall contain a "from" member, which is a string containing a JSON Pointer value that references the location in the target document to move the value from.</p> <p>The "from" location shall exist for the operation to be successful.</p> <p>For example:</p> <pre>{ "op": "MOVE", "from": "/a/b/c", "path": "/a/b/d" }</pre> <p>This operation is functionally identical to a "REMOVE" operation on the "from" location, followed immediately by an "ADD" operation at the target location with the value that was just removed.</p> <p>The "from" location shall not be a proper prefix of the "path" location; i.e., a location cannot be moved into one of its children.</p>
"REMOVE"	<p>This value indicates existing attribute has been deleted from the resource. The "REMOVE" operation removes the value at the target location.</p> <p>The target location shall exist for the operation to be successful.</p> <p>For example:</p> <pre>{ "op": "REMOVE", "path": "/a/b/c" }</pre> <p>If removing an element from an array, any elements above the specified index are shifted one position to the left.</p>
"REPLACE"	<p>This value indicates existing attribute has been updated with new value. The "REPLACE" operation replaces the value at the target location with a new value. The operation object shall contain a "value" member whose content specifies the replacement value.</p> <p>The target location shall exist for the operation to be successful.</p> <p>For example:</p> <pre>{ "op": "REPLACE", "path": "/a/b/c", "value": 42 }</pre> <p>This operation is functionally identical to a "REMOVE" operation for a value, followed immediately by an "ADD" operation at the same location with the replacement value.</p>

## 5.2.3.4 Enumeration: HttpMethod

Table 5.2.3.4-1: Enumeration HttpMethod

Enumeration value	Description
"GET"	HTTP GET method.
"POST"	HTTP POST method.
"PUT"	HTTP PUT method.
"DELETE"	HTTP DELETE method.
"PATCH"	HTTP PATCH method.
"OPTIONS"	HTTP OPTIONS method.
"HEAD"	HTTP HEAD method.
"CONNECT"	HTTP CONNECT method.
"TRACE"	HTTP TRACE method.

## 5.2.3.5 Enumeration: NullValue

Table 5.2.3.5-1: Enumeration NullValue

Enumeration value	Description
null	JSON's null value

## 5.2.3.6 Enumeration: MatchingOperator

Table 5.2.3.6-1: Enumeration MatchingOperator

Enumeration value	Description	Applicability
FULL_MATCH	Indicates a full match between the string against which the matching applies and the provided matching string.	
MATCH_ALL	Indicate a match for any string	
STARTS_WITH	Indicates a match when the string against which the matching applies starts with the provided matching string (e.g. the string "smartmeter-01.company.com" matches the matching string "smartmeter-").	
NOT_START_WITH	Indicates a match when the string against which the matching applies does not start with the provided matching string (e.g. the string "smartmeter-01.company.com" matches the matching string "metersmart-").	
ENDS_WITH	Indicates a match when the string against which the matching applies ends with the matching string (e.g. the string "somehost.company.com" matches the matching string "company.com").	
NOT_END_WITH	Indicates a match when the string against which the matching applies does not end with the matching string (e.g. the string "somehost.company.com" matches the matching string "company.se").	
CONTAINS	Indicates a match when the string against which the matching applies contains the matching string (e.g. the string "media.news.com" matches the matching string "media").	
NOT_CONTAIN	Indicates a match when the string against which the matching applies does not contain the matching string (e.g. the string "media.news.com" matches the matching string "aidem").	

## 5.2.3.7 Enumeration: UpfPacketInspectionFunctionality

Table 5.2.3.7-1: Enumeration UpfPacketInspectionFunctionality

Enumeration value	Description	Applicability
"DEEP_PACKET_INSPECTION"	Higher Layer Packet Inspection	
"MAC_FILTER_BASED_PACKET_DETECTION"	MAC Filter based Packet Detection	
"IP_FILTER_BASED_PACKET_DETECTION"	IP Filter based Packet Detection	

## 5.2.4 Structured Data Types

### 5.2.4.1 Type: ProblemDetails

**Table 5.2.4.1-1: Definition of type ProblemDetails**

Attribute name	Data type	P	Cardinality	Description
type	Uri	O	0..1	A URI reference according to IETF RFC 3986 [6] that identifies the problem type.
title	string	O	0..1	A short, human-readable summary of the problem type. It should not change from occurrence to occurrence of the problem.
status	integer	O	0..1	The HTTP status code for this occurrence of the problem.
detail	string	O	0..1	A human-readable explanation specific to this occurrence of the problem.
instance	Uri	O	0..1	A URI reference that identifies the specific occurrence of the problem.
cause	string	C	0..1	A machine-readable application error cause specific to this occurrence of the problem This IE should be present and provide application-related error information, if available.
invalidParams	array(InvalidParam)	O	1..N	Description of invalid or missing parameters, for a request rejected due to invalid or missing parameters.
supportedFeatures	SupportedFeatures	C	0..1	Features supported by the NF Service Producer.  This IE shall be present when rejecting a request due to an unsupported query parameter, if at least one feature is defined for the corresponding service in the version of the specification that the NF Service Producer implements (see clause 5.2.9 of 3GPP TS 29.500 [25]).  When present, this IE shall indicate the features supported by the NF Service Producer; if the NF Service Producer supports no features, this IE shall be set to the character "0".
accessTokenError	AccessTokenErr	C	0..1	This IE should be present if an SCP request to get an access token was rejected by the NRF. When present, it should contain the Access Token Error content received from the NRF.
accessTokenRequest	AccessTokenReq	O	0..1	This IE may be present if an SCP request to get an access token was rejected by the NRF. When present, it shall contain the Access Token Request that was sent by the SCP.
nrfld	Fqdn	O	0..1	This IE may be present if an SCP request to get an access token was rejected by the NRF. When present, it shall contain the Identity (i.e. FQDN) of the NRF that rejected the access token request.
supportedApiVersions	array(string)	O	1..N	This IE may be present if the SCP did not find NF service producers matching the MAJOR API version of the incoming service request and MAJOR API version(s) are known to be supported by NF service producers for the corresponding service. When present, it shall contain MAJOR API version(s) known to be supported by NF service producers for the corresponding service. The API version shall be encoded as the apiVersionInUri defined in NFServiceVersion defined in 3GPP TS 29.510 [29] (e.g. "v1").
noProfileMatchInfo	NoProfileMatchInfo	O	0..1	This IE may be present if an SCP discovery returned no profiles.
NOTE 1: See IETF RFC 9457 [9] for detailed information and guidance for each attribute, and 3GPP TS 29.501 [2] for guidelines on error handling support by 5GC SBI APIs.				
NOTE 2: Additional attributes may be defined per API.				

## 5.2.4.2 Type: Link

Table 5.2.4.2-1: Definition of type link

Attribute name	Data type	P	Cardinality	Description
href	Uri	M	1	It contains the URI of the linked resource.

## 5.2.4.3 Type PatchItem

Table 5.2.4.3-1: Definition of type PatchItem

Attribute name	Data type	P	Cardinality	Description	Applicability
op	PatchOperation	M	1	This IE indicates the patch operation as defined in IETF RFC 6902 [14] to be performed on resource.	
path	string	M	1	This IE contains a JSON pointer value (as defined in IETF RFC 6901 [12]) that references a location of a resource on which the patch operation shall be performed.	
from	string	C	0..1	This IE indicates the path of the source JSON element (according to JSON Pointer syntax) being moved or copied to the location indicated by the "path" attribute. It shall be present if the patch operation is "move" or "copy".	
value	Any Type	C	0..1	This IE indicates a new value for the resource specified in the path attribute. It shall be present if the patch operation is "add", "replace" or "test". The data type of this attribute shall be the same as the type of the resource on which the patch operation shall be performed. The null value shall be allowed.	

## 5.2.4.4 Type: LinksValueSchema

Table 5.2.4.4-1: Definition of type LinksValueSchema as a list of mutually exclusive alternatives

Data type	Cardinality	Description
array(Link)	1..N	Array of links
Link	1	link

## 5.2.4.5 Type: SelfLink

Table 5.2.4.5-1: Definition of type SelfLink

Attribute name	Data type	P	Cardinality	Description
self	Link	M	1	It contains the URI of the linked resource.

## 5.2.4.6 Type: InvalidParam

Table 5.2.4.6-1: Definition of type InvalidParam

Attribute name	Data type	P	Cardinality	Description
param	string	M	1	<p>If the invalid parameter is an attribute in a JSON body, this IE shall contain the attribute's name and shall be encoded as a JSON Pointer.</p> <p>If the invalid parameter is an HTTP header, this IE shall be formatted as the concatenation of the string "header: " plus the name of such header.</p> <p>If the invalid parameter is a query parameter, this IE shall be formatted as the concatenation of the string "query: " plus the name of such query parameter.</p> <p>If the invalid parameter is a variable part in the path of a resource URI, this IE shall contain the name of the variable, including the symbols "{" and "}" used in OpenAPI specification as the notation to represent variable path segments.</p> <p>If the invalid parameter is a missing claim name in an OAuth2 access token, this IE shall be formatted as the concatenation of the string "access-token-claim: " plus the name of the missing claim. Example: "access-token-claim: producerSnssaiList"</p>
reason	string	O	0..1	<p>A human-readable reason, e.g. "must be a positive integer".</p> <p>In cases involving failed operations in a PATCH request, the reason string should identify the operation that failed using the operation's array index to assist in correlation of the invalid parameter with the failed operation, e.g. "Replacement value invalid for attribute [failed operation index: 4]".</p>

## 5.2.4.7 Type: LinkRm

This data type is defined in the same way as the "Link" data type, but with the OpenAPI "nullable: true" property.

## 5.2.4.8 Type Changeltem

Table 5.2.4.8-1: Definition of type Changeltem

Attribute name	Data type	P	Cardinality	Description	Applicability
op	ChangeType	M	1	This IE indicates the operation to be performed on the resource.	
path	string	M	1	This IE contains a JSON pointer value (as defined in IETF RFC 6901 [12]) that references a target location within the resource on which the change has been applied. (See Note)	
from	string	C	0..1	This IE indicates the path of the source JSON element (according to JSON Pointer syntax) being moved or copied to the location indicated by the "path" attribute. It shall be present if the "op" attribute is of value "MOVE".	
origValue	Any Type	O	0..1	This IE indicates the original value at the target location within the resource specified in the path attribute. This attribute only applies when the "op" attribute is of value "REMOVE", "REPLACE" or "MOVE" Based on the use case, this attribute may be included.	
newValue	Any Type	C	0..1	This IE indicates a new value at the target location within the resource specified in the path attribute. It shall be present if the "op" attribute is of value "ADD", "REPLACE". The data type of this attribute shall be the same as the type of the resource on which the change has happened. The null value shall be allowed.	
NOTE:	As described in IETF RFC 6901 [12], the value "" (empty JSON string) is the JSON Pointer expression to represent "the whole JSON document"; therefore, when the attribute "path" takes value "" and attribute "op" takes values "ADD" or "REMOVE", this shall be interpreted as the creation or deletion respectively of the resource to which this "Changeltem" refers to.				

## 5.2.4.9 Type NotifyItem

Table 5.2.4.9-1: Definition of type NotifyItem

Attribute name	Data type	P	Cardinality	Description	Applicability
resourceId	Uri	M	1	This IE contains the URI of the resource which has been changed.	
changes	array(Changeltem)	M	1..N	This IE contains the changes which have been applied on the resource identified by the resourceId attribute. See NOTE.	
NOTE:	There may be more than one way to express a given modification of a resource's representation. E.g. removing one attribute from an object can be done by a) a change item with op set to "REMOVE" and path pointing to the attribute to be removed, or b) a change item with op set to "REPLACE" and path pointing to the object, and a newValue of the object i.e. without the attribute that has been removed. It is up to sending nodes decision to select one of the available ways to express the modification and the receiving node shall support all possible ways.				

## 5.2.4.10 Type: ComplexQuery

**Table 5.2.4.10-1: Definition of type ComplexQuery as a list of mutually exclusive alternatives**

Data type	Cardinality	Description
Cnf	1	A conjunctive normal form
Dnf	1	A disjunctive normal form

The ComplexQuery data type is either a conjunctive normal form or a disjunctive normal form. The attribute names "cnfUnits" and "dnfUnits" (see clause 5.2.4.11 and clause 5.2.4.12) serve as discriminator.

## 5.2.4.11 Type: Cnf

**Table 5.2.4.11-1: Definition of type Cnf**

Attribute name	Data type	P	Cardinality	Description	Applicability
cnfUnits	array(CnfUnit)	M	1..N	During the processing of cnfUnits attribute, all the members in the array shall be interpreted as logically concatenated with logical "AND".	

## 5.2.4.12 Type: Dnf

**Table 5.2.4.12-1: Definition of type Dnf**

Attribute name	Data type	P	Cardinality	Description	Applicability
dnfUnits	array(DnfUnit)	M	1..N	During the processing of dnfUnits attribute, all the members in the array shall be interpreted as logically concatenated with logical "OR".	

## 5.2.4.13 Type: CnfUnit

**Table 5.2.4.13-1: Definition of type CnfUnit**

Attribute name	Data type	P	Cardinality	Description	Applicability
cnfUnit	array(Atom)	M	1..N	During the processing of cnfUnit attribute, all the members in the array shall be interpreted as logically concatenated with logical "OR".	

## 5.2.4.14 Type: DnfUnit

**Table 5.2.4.14-1: Definition of type DnfUnit**

Attribute name	Data type	P	Cardinality	Description	Applicability
dnfUnit	array(Atom)	M	1..N	During the processing of dnfUnit attribute, all the members in the array shall be interpreted as logically concatenated with logical "AND".	

## 5.2.4.15 Type: Atom

Table 5.2.4.15-1: Definition of type Atom

Attribute name	Data type	P	Cardinality	Description	Applicability
attr	string	M	1	This attribute contains the name of a defined query parameter.	
value	Any Type	M	1	This attribute contains the value of the query parameter as indicated by attr attribute.	
negative	boolean	O	0..1	This attribute indicates whether the negative condition applies for the query condition.	

## 5.2.4.16 Void

## 5.2.4.17 Type: PatchResult

Table 5.2.4.17-1: Definition of type PatchResult

Attribute name	Data type	P	Cardinality	Description	Applicability
report	array(ReportItem)	M	1..N	The execution report contains an array of report items. Each report item indicates one failed modification.	

## 5.2.4.18 Type: ReportItem

Table 5.2.4.18-1: Definition of type ReportItem

Attribute name	Data type	P	Cardinality	Description	Applicability
path	string	M	1	This attribute contains a JSON pointer value (as defined in IETF RFC 6901 [12]) that references a location of a resource to which the modification is subject.	
reason	string	O	0..1	A human-readable reason providing details on the reported modification failure. The reason string should identify the operation that failed using the operation's array index to assist in correlation of the invalid parameter with the failed operation, e.g. "Replacement value invalid for attribute [failed operation index: 4]".	

## 5.2.4.19 Type: HalTemplate

Table 5.2.4.19-1: Definition of type HalTemplate

Attribute name	Data type	P	Cardinality	Description
title	string	O	0..1	A human-readable string that can be used to identify this template.
method	HttpMethod	M	1	The HTTP method that should be applied for the corresponding link. If the value is not understood, the value shall be treated as an HTTP GET.
contentType	string	O	0..1	The media type that should be used for the corresponding request. If the attribute is missing, or contains an unrecognized value, the client should act as if the contentType is set to "application/json".
properties	array(Property)	O	1..N	The properties that should be included in the body of the corresponding request. If the contentType attribute is set to "application/json", then this attribute describes the attributes of the JSON object of the body.

## 5.2.4.20 Type: Property

Table 5.2.4.20-1: Definition of type Property

Attribute name	Data type	P	Cardinality	Description
name	string	M	1	The name of the property.
required	boolean	O	0..1	Indicates whether the property is required: - true: required - false(default): not required
regex	string	O	0..1	A regular expression string to be applied to the value of the property.
value	string	O	0..1	The property value. When present, it shall be a valid JSON string.

## 5.2.4.21 Type: RedirectResponse

Table 5.2.4.21-1: Definition of type RedirectResponse

Attribute name	Data type	P	Cardinality	Description
cause	string	C	0..1	A machine-readable cause string, specific to this occurrence of the redirection. If the redirection is initiated by an SCP towards another SCP, this IE shall be present and set to "SCP_REDIRECTION" (see clause 6.10.9 of 3GPP TS 29.500 [25]). If the redirection is initiated by an SEPP towards another SEPP over a non N32 interface, this IE shall be present and set to "SEPP_REDIRECTION" (see clause 6.10.9 of 3GPP TS 29.500 [25] and clause 6.1.8 of 3GPP TS 29.573 [52]).
targetScp	Uri	O	0..1	ApiRoot of the SCP towards which an HTTP request is redirected (see clause 6.10.9 of 3GPP TS 29.500 [25]).
targetSepp	Uri	O	0..1	ApiRoot of the SEPP towards which a non N32 interface HTTP request is redirected (see clause 6.10.9 of 3GPP TS 29.500 [25] and clause 6.1.8 of 3GPP TS 29.573 [52]).

## 5.2.4.22 Type: TunnelAddress

Table 5.2.4.22-1: Definition of type TunnelAddress

Attribute name	Data type	P	Cardinality	Description	Applicability
ipv4Addr	Ipv4Addr	C	0..1	IPv4 address (NOTE)	
ipv6Addr	Ipv6Addr	C	0..1	IPv6 address (NOTE)	
portNumber	UInteger	M	1	UDP Port	

NOTE: At least one of these IEs shall be present.

## 5.2.4.23 Type: FqdnPatternMatchingRule

Table 5.2.4.23-1: Definition of type FqdnPatternMatchingRule

Attribute name	Data type	P	Cardinality	Description
regex	string	C	0..1	One FQDN pattern, defined as a regular expression according to the ECMA-262 dialect [44].  (NOTE)
stringMatchingRule	StringMatchingRule	C	0..1	One FQDN pattern, described as a string matching rule.  (NOTE)

NOTE: When provisioning an FQDN pattern, the StringMatchingRule shall be preferred over regular expression and used whenever possible (i.e. if the pattern can be described by a string matching rule) to optimize the matching process and reduce the processing load, since the use of regular expressions can be more computing intensive than using string matching rule. Either the regex or the stringMatchingRule shall be present.

EXAMPLE 1: A FQDN pattern described by a string matching rule matching all FQDNs with "smartmeter-  
{factoryID}.company.com" where "{factoryID}" can be any string  
JSON: {"stringMatchingRule": {"stringMatchingConditions":[{"matchingString": "smartmeter-  
", "matchingOperator": "STARTS\_WITH"}, {"matchingString":  
".company.com", "matchingOperator": "ENDS\_WITH"}]}}

EXAMPLE 2: A FQDN pattern described by a regular expression matching all FQDNs with "smartmeter-  
{factoryID}.company.com" where "{factoryID}" can be any string.  
JSON: {"regex": "^smartmeter-.\+\.company\.com\$"}

## 5.2.4.24 Type: StringMatchingRule

Table 5.2.4.24-1: Definition of type StringMatchingRule

Attribute name	Data type	P	Cardinality	Description
stringMatchingConditions	array(StringMatchingCondition)	M	1..N	Contains a list of conditions which shall be evaluated for string matching.

NOTE: The conditions in the stringMatchingConditions array shall be evaluated as "and" logical relationship.

## 5.2.4.25 Type: StringMatchingCondition

Table 5.2.4.25-1: Definition of type StringMatchingCondition

Attribute name	Data type	P	Cardinality	Description
matchingString	string	C	0..1	This IE shall be present to identify the string against which the matching is performed except when the matchingOperator is MATCH_ALL.
matchingOperator	MatchingOperator	M	1	Identifies the matching operation.

## 5.2.4.26 Type: Ipv4AddressRange

Table 5.2.4.26-1: Definition of type Ipv4AddressRange

Attribute name	Data type	P	Cardinality	Description
start	Ipv4Addr	M	1	First value identifying the start of an IPv4 address range
end	Ipv4Addr	M	1	Last value identifying the end of an IPv4 address range

## 5.2.4.27 Type: Ipv6AddressRange

Table 5.2.4.27-1: Definition of type Ipv6AddressRange

Attribute name	Data type	P	Cardinality	Description
start	Ipv6Addr	M	1	First value identifying the start of an IPv6 address range
end	Ipv6Addr	M	1	Last value identifying the end of an IPv6 address range

## 5.2.4.28 Type: Ipv6PrefixRange

Table 5.2.4.28-1: Definition of type Ipv6PrefixRange

Attribute name	Data type	P	Cardinality	Description
start	Ipv6Prefix	M	1	First value identifying the start of an Ipv6 prefix range
end	Ipv6Prefix	M	1	Last value identifying the end of an Ipv6 prefix range
NOTE:	When Ipv6PrefixRange is used to identify a range of Ipv6 addresses served by certain NF (e.g. BSF), the range of Ipv6 addresses identified by the Ipv6PrefixRange shall include the entire Ipv6 addresses represented by the "start" and "end" Ipv6 prefixes. For example, if the "start" attribute is set to "240e:006a:0000:0000::/32" and the "end" attribute is set to "250e:006a:0000:0000::/32", the Ipv6PrefixRange identifies all the Ipv6 addresses from the start Ipv6 address "240e:006a:0000:0000::/32" to the end Ipv6 address "250e:006a:ffff:ffff:ffff:ffff:ffff:ffff/32".			

## 5.2.4.29 Type NfSignallingInfo

Table 5.2.4.29-1: Definition of type NfSignallingInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
nfInstanceId	NfInstanceId	M	1	The NF instance ID of the NF.	
nfSigInfoPerWdw	array(NfSignallingInfoPerTimeWindow)	O	1..N	Contains NF signalling information per time window.	
nfHeartbeatInfo	NfHeartbeatInfo	O	0..1	Contains NF heartbeat-related information.	
unexpStatusInd	boolean	O	0..1	Indicates whether the NF is at an unexpected status (i.e. deviates from the normal operations, based on thresholds or rules configured by operator). - "true": the NF is at an unexpected status. - "false": the NF is not at an unexpected status. The default value is "false" if omitted.	

## 5.2.4.30 Type NfSignallingInfoPerTimeWindow

Table 5.2.4.30-1: Definition of type NfSignallingInfoPerTimeWindow

Attribute name	Data type	P	Cardinality	Description	Applicability
tw	TimeWindow	M	1	The time window in which the provided signalling information occurred.	
nfSigInfoPerService	array(NfSignallingInfoPerService)	M	1..N	NF signalling information per NF service instance in the NF instance.	

## 5.2.4.31 Type NfSignallingInfoPerService

Table 5.2.4.31-1: Definition of type NfSignallingInfoPerService

Attribute name	Data type	P	Cardinality	Description	Applicability
nfServiceInstanceId	string	M	1	The NF service instance ID as specified in table 6.22.2-1 of 3GPP TS 23.288 [77] to which the provided signalling information refers.	
serviceName	ServiceName	M	1	The name of the service of the NF service instance as specified in clause 6.1.6.3.11 of 3GPP TS 29.510 [29].	
avgProcTime	Float	O	0..1	The average processing time (in milliseconds) of each request, i.e. the time duration between receiving the request from an NF and sending the response to the NF.	
numOfReq	UInteger	O	0..1	The number of requests received for this service by the NF service instance. (NOTE)	
numOfReqUnresp	UInteger	O	0..1	The number of requests received for this service by the NF service instance which were not responded. (NOTE)	
numOfReqReject	UInteger	O	0..1	The number of requests received for this service by the NF service instance which were rejected. (NOTE)	
numOfRedMessages	UInteger	O	0..1	The number of redundant messages received by the NF service instance, i.e. messages which were transmitted multiple times.	
numOfPosteriorReq	UInteger	O	0..1	The number of posterior requests, i.e. requests that were triggered by a previous request received by the NF service instance.	
NOTE: The number of failed requests equals to "numOfReqUnresp" plus "numOfReqReject". The number of successful requests equals to "numOfReq" minus the number of failed requests.					

## 5.2.4.32 Type NfHeartbeatInfo

Table 5.2.4.32-1: Definition of type NfHeartbeatInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
numOfRetrans	UInteger	O	0..1	Number of retransmissions performed.	
hbIntvl	UInteger	O	0..1	NF heartbeat interval in milliseconds.	

## 5.3 Data Types related to Subscription, Identification and Numbering

### 5.3.1 Introduction

This clause defines common data types related to subscription, identification and numbering information.

### 5.3.2 Simple Data Types

This clause specifies common simple data types.

**Table 5.3.2-1: Simple Data Types**

Type Name	Type Definition	Description
Dnn	string	String representing a Data Network as defined in clause 9A of 3GPP TS 23.003 [7]; it shall contain either a DNN Network Identifier, or a full DNN with both the Network Identifier and Operator Identifier, as specified in 3GPP TS 23.003 [7] clauses 9.1.1 and 9.1.2. It shall be coded as string in which the labels are separated by dots (e.g. "Label1.Label2.Label3"). See NOTE 2.  As specified for APNs in 3GPP TS 23.003 [7], clause 9.1, DNNs shall be handled as case-insensitive strings.
DnnRm	string	This data type is defined in the same way as the "Dnn" data type, but with the OpenAPI "nullable: true" property.
WildcardDnn	string	String representing the Wildcard DNN. It shall contain the string "*".  Pattern: '^[*]*\$'
WildcardDnnRm	string	This data type is defined in the same way as the "WildcardDnn" data type, but with the OpenAPI "nullable: true" property.
Gpsi	string	String representing a Gpsi shall contain either an External Id or an MSISDN. It shall be formatted as follows: -External Identifier: "extid-<extid>", where <extid> shall be formatted according to clause 19.7.2 of 3GPP TS 23.003 [7] that describes an External Identifier. -MSISDN: "msisdn-<msisdn>", where <msisdn> shall be formatted according to clause 3.3 of 3GPP TS 23.003 [7] that describes an MSISDN. Pattern: '^(\msisdn-[0-9]{5,15})extid-.\+@.\+.\+)\$'
GpsiRm	string	This data type is defined in the same way as the "Gpsi" data type, but with the OpenAPI "nullable: true" property.
Groupld	string	String representing a group of devices network internal globally unique ID which identifies a set of IMSIs, as specified in clause 19.9 of 3GPP TS 23.003 [7]. For 5G related service, the GroupServiceId shall identify the specific service for which the IMSI-Group-Id is used, as specified in clause 5.3.3.1.  Pattern: '^([A-Fa-f0-9]{8}-[0-9]{3}-[0-9]{2,3}-([A-Fa-f0-9][A-Fa-f0-9]){1,10})\$'
GroupldRm	string	This data type is defined in the same way as the "Groupld" data type, but with the OpenAPI "nullable: true" property.
ExternalGroupld	string	String representing External Group Identifier that identifies a group made up of one or more subscriptions associated to a group of IMSIs, as specified in clause 19.7.3 of 3GPP TS 23.003 [7].  Pattern: '^extgroupid-[@]+@[^@]+\$'
ExternalGroupldRm	string	This data type is defined in the same way as the "ExternalGroupld" data type, but with the OpenAPI "nullable: true" property.

Pei	string	<p>String representing a Permanent Equipment Identifier that may contain:</p> <ul style="list-style-type: none"> <li>- an IMEI or IMEISV, as specified in clause 6.2 of 3GPP TS 23.003 [7];</li> <li>- a MAC address for a 5G-RG or FN-RG via wireline access, with an indication that this address cannot be trusted for regulatory purpose if this address cannot be used as an Equipment Identifier of the FN-RG, as specified in clause 4.7.7 of 3GPP TS 23.316 [30].</li> <li>- an IEEE Extended Unique Identifier (EUI-64), for UEs not supporting any 3GPP access technologies, as defined in IEEE "Guidelines for Use of Extended Unique Identifier (EUI), Organizationally Unique Identifier (OUI), and Company ID (CID)" [38].</li> </ul> <p>Pattern: <code>^(imei-[0-9]{15} imeisv-[0-9]{16}) mac((-[0-9a-fA-F]{2}){6})(-untrusted)? eui((-[0-9a-fA-F]{2}){8}).+)\$</code>. See NOTE 1.</p> <p>Examples:  imei-012345678901234  imeisv-0123456789012345  mac-00-00-5E-00-53-00  mac-00-00-5E-00-53-00-untrusted  eui-AC-DE-48-23-45-67-01-9F</p>
PeiRm	string	This data type is defined in the same way as the "Pei" data type, but with the OpenAPI "nullable: true" property.
Supi	string	<p>String representing a Supi that shall contain either an IMSI, a network specific identifier, a Global Cable Identifier (GCI) or a Global Line Identifier (GLI) as specified in clause 2.2A of 3GPP TS 23.003 [7].</p> <p>It shall be formatted as follows:</p> <ul style="list-style-type: none"> <li>- for an IMSI "imsi-&lt;imsi&gt;", where &lt;imsi&gt; shall be formatted according to clause 2.2 of 3GPP TS 23.003 [7] that describes an IMSI.</li> <li>- for a network specific identifier "nai-&lt;nai&gt;", where &lt;nai&gt; shall be formatted according to clause 28.7.2 of 3GPP TS 23.003 [7] that describes an NAI.</li> <li>- for a GCI: "gci-&lt;gci&gt;", where &lt;gci&gt; shall be formatted according to clause 28.15.2 of 3GPP TS 23.003 [7].</li> <li>- for a GLI: "gli-&lt;gli&gt;", where &lt;gli&gt; shall be formatted according to clause 28.16.2 of 3GPP TS 23.003 [7].</li> </ul> <p>To enable that the value is used as part of an URI, the string shall only contain characters allowed according to the "lower-with-hyphen" naming convention defined in 3GPP TS 29.501 [2].</p> <p>Pattern: <code>^(imsi-[0-9]{5,15} nai-.+ gci-.+ gli-.+).+\$</code> (NOTE 1).</p>
SupiRm	string	This data type is defined in the same way as the "Supi" data type, but with the OpenAPI "nullable: true" property.
NfInstancelid	string	<p>String uniquely representing a NF instance. The format of the NF Instance ID shall be a Universally Unique Identifier (UUID) version 4, as described in IETF RFC 9562 [15]. The hexadecimal letters should be formatted as lower-case characters by the sender, and they shall be handled as case-insensitive by the receiver.</p> <p>Example:  "4ace9d34-2c69-4f99-92d5-a73a3fe8e23b"</p> <p>(NOTE 3)</p>

AmfId	string	String representing the AMF ID composed of AMF Region ID (8 bits), AMF Set ID (10 bits) and AMF Pointer (6 bits) as specified in clause 2.10.1 of 3GPP TS 23.003 [7]. It is encoded as a string of 6 hexadecimal characters (i.e., 24 bits). Pattern: <code>^[A-Fa-f0-9]{6}\$</code>
AmfRegionId	string	String representing the AMF Region ID (8 bits), as specified in clause 2.10.1 of 3GPP TS 23.003 [7]. It is encoded as a string of 2 hexadecimal characters (i.e. 8 bits). Pattern: <code>^[A-Fa-f0-9]{2}\$</code>
AmfSetId	string	String representing the AMF Set ID (10 bits) as specified in clause 2.10.1 of 3GPP TS 23.003 [7]. It is encoded as a string of 3 hexadecimal characters where the first character is limited to values 0 to 3 (i.e. 10 bits). Pattern: <code>^[0-3][A-Fa-f0-9]{2}\$</code>
RfspIndex	integer	Unsigned integer representing the "Subscriber Profile ID for RAT/Frequency Priority" as specified in 3GPP TS 36.413 [16]. Minimum = 1. Maximum = 256.
RfspIndexRm	integer	This data type is defined in the same way as the "RfspIndex" data type, but with the OpenAPI "nullable: true" property.
NfGroupId	string	Identifier of a group of NFs
MtcProviderInformation	string	String uniquely identifying MTC provider information.
CagId	string	String containing a Closed Access Group Identifier. Pattern: <code>^[A-Fa-f0-9]{8}\$</code>
SupiOrSuci	string	String representing a SUPI or a SUCI. Pattern: <code>^(imsi-[0-9]{5,15} nai-.+ gli-.+ gci-.+ suci-(0-[0-9]{3}-[0-9]{2,3}){1-7}-.+-[0-9]{1,4}-(0-0-.*[a-fA-F1-9]-([1-9] [1-9][0-9] 1[0-9]{2})2[0-4][0-9]25[0-5])-[a-fA-F0-9]+).+\$</code>
Imsi	string	String representing an IMSI Pattern: <code>^[0-9]{5,15}\$</code>
ApplicationLayerId	string	String representing an application layer ID. The format of the application layer ID parameter is same as the Application layer ID defined in clause 11.3.4 of 3GPP TS 24.554 [57].
NsacSai	string	String that uniquely identifies the NSAC Service Area Identifier. Reserved value(s): "ENTIRE_PLMN", it indicates the NSACF serves the entire PLMN.
NOTE 1: The encoding of 3GPP defined identifiers (e.g. IMSI, NAI, IMEI, GCI, GLI) shall be prefixed with its corresponding prefix (e.g. 'imsi-', 'nai-', 'imei-', 'gci-', 'gli-').		
NOTE 2: Whether the Dnn data type contains just the DNN Network Identifier, or the Network Identifier plus the Operator Identifier, shall be documented in each API where this data type is used.		
NOTE 3: NFs shall be able to receive a NF Instance Id in any UUID format.		

### 5.3.3 Enumerations

#### 5.3.3.1 Enumeration: GroupServiceId

The enumeration GroupServiceId is a part of IMSI-Group-Id (see clause 19.9 of 3GPP TS 23.003 [7]) and indicates the specific service for which the IMSI-Group-Id is used. Values greater than 1000 are reserved for home operator specific use. IMSI-Group-IDs with a Group-Service-Id in this range shall not be sent outside the HPLMN unless roaming agreements allow so.

**Table 5.3.3.1-1: Enumeration GroupServiceId**

Enumeration value	Description
1	Group specific NAS level congestion control
2	Group specific Monitoring of Number of UEs present in a geographical area
3	Group specific for 5G LAN-type service

## 5.3.4 Structured Data Types

### 5.3.4.1 Type: Guami

**Table 5.3.4.1-1: Definition of type Guami**

Attribute name	Data type	P	Cardinality	Description
plmnId	PlmnIdNid	M	1	PLMN Identity and Network Identity
amfId	AmfId	M	1	AMF Identity

### 5.3.4.2 Type: NetworkId

**Table 5.3.4.2-1: Definition of type NetworkId**

Attribute name	Data type	P	Cardinality	Description
mcc	Mcc	C	0..1	Mobile Country Code
mnc	Mnc	C	0..1	Mobile Network Code
NOTE: At least one MNC or MCC shall be included.				

### 5.3.4.3 Type: GuamiRm

This data type is defined in the same way as the "Guami" data type, but with the OpenAPI "nullable: true" property.

## 5.4 Data Types related to 5G Network

### 5.4.1 Introduction

This clause defines common data types related to 5G Network (other than related to 5G QoS).

### 5.4.2 Simple Data Types

This clause specifies common simple data types.

**Table 5.4.2-1: Simple Data Types**

Type Name	Type Definition	Description
ApplicationId	string	String providing an application identifier.
ApplicationIdRm	string	This data type is defined in the same way as the "ApplicationId" data type, but with the OpenAPI "nullable: true" property.
PduSessionId	integer	Unsigned integer identifying a PDU session, within the range 0 to 255, as specified in clause 11.2.3.1b, bits 1 to 8, of 3GPP TS 24.007 [13]. If the PDU Session ID is allocated by the Core Network for UEs not supporting N1 mode, reserved range 64 to 95 is used. PDU Session ID within the reserved range is only visible in the Core Network (NOTE 1).
Mcc	string	Mobile Country Code part of the PLMN, comprising 3 digits, as defined in clause 9.3.3.5 of 3GPP TS 38.413 [11]. Pattern: '^[0-9]{3}\$'
MccRm	string	This data type is defined in the same way as the "Mcc" data type, but with the OpenAPI "nullable: true" property.
Mnc	string	Mobile Network Code part of the PLMN, comprising 2 or 3 digits, as defined in clause 9.3.3.5 of 3GPP TS 38.413 [11]. (NOTE 2) Pattern: '^[0-9]{2,3}\$'
MncRm	string	This data type is defined in the same way as the "Mnc" data type, but with the OpenAPI "nullable: true" property.
Tac	string	2 or 3-octet string identifying a tracking area code as specified in clause 9.3.3.10 or 9.3.3.16 of 3GPP TS 38.413 [11], in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the TAC shall appear first in the string, and the character representing the 4 least significant bit of the TAC shall appear last in the string.  Examples: A legacy TAC 0x4305 shall be encoded as "4305". An extended TAC 0x63F84B shall be encoded as "63F84B"
TacRm	string	This data type is defined in the same way as the "Tac" data type, but with the OpenAPI "nullable: true" property.
EutraCellId	string	28-bit string identifying an E-UTRA Cell Id as specified in clause 9.3.1.9 of 3GPP TS 38.413 [11], in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the Cell Id shall appear first in the string, and the character representing the 4 least significant bit of the Cell Id shall appear last in the string.  Pattern: '^[A-Fa-f0-9]{7}\$'  Example: An E-UTRA Cell Id 0x5BD6007 shall be encoded as "5BD6007".
EutraCellIdRm	string	This data type is defined in the same way as the "EutraCellId" data type, but with the OpenAPI "nullable: true" property.
NrCellId	string	36-bit string identifying an NR Cell Id as specified in clause 9.3.1.7 of 3GPP TS 38.413 [11], in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the Cell Id shall appear first in the string, and the character representing the 4 least significant bit of the Cell Id shall appear last in the string.  Pattern: '^[A-Fa-f0-9]{9}\$'  Example: An NR Cell Id 0x225BD6007 shall be encoded as "225BD6007".
NrCellIdRm	string	This data type is defined in the same way as the "NrCellId" data type, but with the OpenAPI "nullable: true" property.
Dnai	string	DNAI (Data network access identifier), see clause 5.6.7 of 3GPP TS 23.501 [8].

DnaiRm	string	This data type is defined in the same way as the "Dnai" data type, but with the OpenAPI "nullable: true" property.
5GMmCause	UInteger	This represents the 5GMM cause code values as specified in 3GPP TS 24.501 [20].
AreaCodeRm	string	This data type is defined in the same way as the "AreaCode" data type, but with the OpenAPI "nullable: true" property.
AmfName	Fqdn	FQDN (Fully Qualified Domain Name) of the AMF as defined in clause 28.3.2.5 of 3GPP TS 23.003 [7].
AreaCode	string	Values are operator specific.
N3IwfId	string	This represents the identifier of the N3IWF ID as specified in clause 9.3.1.57 of 3GPP TS 38.413 [11] in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the N3IWF ID shall appear first in the string, and the character representing the 4 least significant bit of the N3IWF ID shall appear last in the string. Pattern: '^[A-Fa-f0-9]+\$'  Example: The N3IWF Id 0x5BD6 shall be encoded as "5BD6".
WAgfId	string	This represents the identifier of the W-AGF ID as specified in clause 9.3.1.162 of 3GPP TS 38.413 [11] in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the W-AGF ID shall appear first in the string, and the character representing the 4 least significant bit of the W-AGF ID shall appear last in the string. Pattern: '^[A-Fa-f0-9]+\$'  Example: The W-AGF Id 0x5BD6 shall be encoded as "5BD6".
TngfId	string	This represents the identifier of the TNGF ID as specified in clause 9.3.1.161 of 3GPP TS 38.413 [11] in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the TNGF ID shall appear first in the string, and the character representing the 4 least significant bit of the TNGF ID shall appear last in the string. Pattern: '^[A-Fa-f0-9]+\$'  Example: The TNGF Id 0x5BD6 shall be encoded as "5BD6".
NgeNbId	string	This represents the identifier of the ng-eNB ID as specified in clause 9.3.1.8 of 3GPP TS 38.413 [11].  The string shall be formatted with following pattern: Pattern: '^(\MacroNGeNB-[A-Fa-f0-9]{5}) LMacroNGeNB-[A-Fa-f0-9]{6} SMacroNGeNB-[A-Fa-f0-9]{5})\$'  The value of the ng-eNB ID shall be encoded in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The padding 0 shall be added to make multiple nibbles, so the most significant character representing the padding 0 if required together with the 4 most significant bits of the ng-eNB ID shall appear first in the string, and the character representing the 4 least significant bit of the ng-eNB ID (to form a nibble) shall appear last in the string.  Examples: " SMacroNGeNB-34B89" indicates a Short Macro NG-eNB ID with value 0x34B89.

Nid	string	This represents the Network Identifier, which together with a PLMN ID is used to identify an SNPN (see 3GPP TS 23.003 [7] and 3GPP TS 23.501 [8] clause 5.30.2.1). Pattern: '[A-Fa-f0-9]{11}'
NidRm	string	This data type is defined in the same way as the "Nid" data type, but with the OpenAPI "nullable: true" property.
NfSetId	string	<p>NF Set Identifier (see clause 28.12 of 3GPP TS 23.003 [7]), formatted as the following string:</p> <p>" set&lt;Set ID&gt;.&lt;nftype&gt;set.5gc.mnc&lt;MNC&gt;.mcc&lt;MCC&gt;", or "set&lt;SetID&gt;.&lt;NFType&gt;set.5gc.nid&lt;NID&gt;.mnc&lt;MNC&gt;.mcc&lt;MCC&gt;"</p> <p>with</p> <p>&lt;MCC&gt; encoded as defined in clause 5.4.2 ("Mcc" data type definition)</p> <p>&lt;MNC&gt; encoding the Mobile Network Code part of the PLMN, comprising 3 digits. If there are only 2 significant digits in the MNC, one "0" digit shall be inserted at the left side to fill the 3 digits coding of MNC. Pattern: '[0-9]{3}'</p> <p>&lt;NFType&gt; encoded as a value defined in Table 6.1.6.3.3-1 of 3GPP TS 29.510 [29] but with lower case characters</p> <p>&lt;Set ID&gt; encoded as a string of characters consisting of alphabetic characters (A-Z and a-z), digits (0-9) and/or the hyphen (-) and that shall end with either an alphabetic character or a digit. Pattern: '[A-Za-z0-9\-\-]*[A-Za-z0-9]'</p> <p>Examples: "setxyz.smfset.5gc.mnc012.mcc345" "set12.pcfset.5gc.mnc012.mcc345"</p> <p>As specified for NF Set ID in 3GPP TS 23.003 [7], clause 28.12, NF Set ID shall be handled as case-insensitive string.</p>

NfServiceSetId	string	<p>NF Service Set Identifier (see clause 28.13 of 3GPP TS 23.003 [7]) formatted as the following string:</p> <p>" set&lt;Set ID&gt;.sn&lt;Service Name&gt;.nfi&lt;NF Instance ID&gt;.5gc.mnc&lt;MNC&gt;.mcc&lt;MCC&gt;" or  "set&lt;SetID&gt;.sn&lt;ServiceName&gt;.nfi&lt;NFInstanceID&gt;.5gc.nid&lt;NID&gt;.mnc&lt;MNC&gt;.mcc&lt;MCC&gt;"</p> <p>with</p> <p>&lt;MCC&gt; encoded as defined in clause 5.4.2 ("Mcc" data type definition)</p> <p>&lt;MNC&gt; encoding the Mobile Network Code part of the PLMN, comprising 3 digits. If there are only 2 significant digits in the MNC, one "0" digit shall be inserted at the left side to fill the 3 digits coding of MNC. Pattern: '[0-9]{3}\$'</p> <p>&lt;NID&gt; encoded as defined in clause 5.4.2 ("Nid" data type definition)</p> <p>&lt;NFInstanceId&gt; encoded as defined in clause 5.3.2</p> <p>&lt;ServiceName&gt; encoded as defined in 3GPP TS 29.510 [29]</p> <p>&lt;Set ID&gt; encoded as a string of characters consisting of alphabetic characters (A-Z and a-z), digits (0-9) and/or the hyphen (-) and that shall end with either an alphabetic character or a digit.  Pattern: '[A-Za-z0-9\-\-]*[A-Za-z0-9]'</p> <p>Examples:</p> <p>"setxyz.snnsmf-pdusession.nfi54804518-4191-46b3-955c-ac631f953ed8.5gc.mnc012.mcc345"  "set2.snnpcf-smpolicycontrol.nfi54804518-4191-46b3-955c-ac631f953ed8.5gc.mnc012.mcc345"</p> <p>As specified for NF Service Set ID in 3GPP TS 23.003 [7], clause 28.13, NF Service Set ID shall be handled as case-insensitive string.</p>
PlmnAssiUeRadioCapId	Bytes	String with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters, encoding the "UE radio capability ID" IE as specified in clause 9.11.3.68 of 3GPP TS 24.501 [20] (starting from octet 1).
ManAssiUeRadioCapId	Bytes	String with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters, encoding the "UE radio capability ID" IE as specified in clause 9.11.3.68 of 3GPP TS 24.501 [20] (starting from octet 1).
TypeAllocationCode	string	<p>Type Allocation Code (TAC) of the UE, comprising the initial eight-digit portion of the 15-digit IMEI and 16-digit IMEISV codes. See clause 6.2 of 3GPP TS 23.003 [7].</p> <p>Pattern: '[0-9]{8}\$'</p>
HfcNid	string	This IE represents the identifier of the HFC node Id as specified in CableLabs WR-TR-5WWC-ARCH [32]. It is provisioned by the wireline operator as part of wireline operations and may contain up to six characters.
HfcNidRm	string	This data type is defined in the same way as the "HfcNid" data type, but with the OpenAPI "nullable: true" property.

ENbld	string	<p>This represents the identifier of the eNB ID as specified in clause 9.2.1.37 of 3GPP TS 36.413 [16].</p> <p>The string shall be formatted with following pattern: Pattern: '^(\MacroNB-[A-Fa-f0-9]{5} LMacroNB-[A-Fa-f0-9]{6} SMacroNB-[A-Fa-f0-9]{5} HomeNB-[A-Fa-f0-9]{7})\$'</p> <p>The value of the eNB ID shall be encoded in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The padding 0 shall be added to make multiple nibbles, so the most significant character representing the padding 0 if required together with the 4 most significant bits of the eNB ID shall appear first in the string, and the character representing the 4 least significant bit of the eNB ID (to form a nibble) shall appear last in the string.</p> <p>Examples: "SMacroNB-34B89" indicates a Short Macro eNB ID with value 0x34B89.</p>
Gli	Bytes	<p>Global Line Identifier uniquely identifying the line connecting the 5G-BRG or FN-BRG to the 5GS. See clause 28.16.3 of 3GPP TS 23.003 [7].</p> <p>This shall be encoded as a string with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters, representing the GLI value (up to 150 bytes) encoded as specified in BBF WT-470 [37].</p>
Gci	string	<p>Global Cable Identifier uniquely identifying the connection between the 5G-CRG or FN-CRG to the 5GS. See clause 28.15.4 of 3GPP TS 23.003 [7].</p> <p>This shall be encoded as a string per clause 28.15.4 of 3GPP TS 23.003 [7], and compliant with the syntax specified in clause 2.2 of IETF RFC 7542 [47] for the username part of a NAI. The GCI value is specified in CableLabs WR-TR-5WWC-ARCH [32].</p>
NsSrg	string	String representing Network Slice Simultaneous Registration Group (see clause 5.15.12 of 3GPP TS 23.501 [8])
NsSrgRm	string	This data type is defined in the same way as the "NsSrg" data type, but with the OpenAPI "nullable: true" property.
RelayServiceCode	integer	<p>Relay Service Code to identify a connectivity service provided by the UE-to-Network relay or the UE-to-UE relay.</p> <p>Integer type as defined in OpenAPI Specification [3], with value range from 0 to 16777215 (decimal).</p> <p>Minimum = 0. Maximum = 16777215.</p>
5GPrukId	string	<p>Prose Remote User Key ID over Control Plane</p> <p>A string carrying the CP-PRUK ID of the the 5G ProSe Remote UE or the 5G ProSe End UE as specified in 3GPP TS 33.503 [50].</p> <p>The CP-PRUK ID is a string in NAI format as specified in clause 28.7.11 of 3GPP TS 23.003 [7].</p> <p>pattern: "Arid[0-9]{1,4}\.pid[0-9a-fA-F]+\@prose-cp\.5gc\.mnc[0-9]{2,3}\.mcc[0-9]{3}\.3gppnetwork\.org\$"</p>
NsagId	integer	<p>Containing a Network Slice AS Group ID, see 3GPP TS 38.413 [11].</p> <p>Values between 0 and 255 are allowed for this data type in this release.</p>
NsagIdRm	integer	This data type is defined in the same way as the "NsagId" data type, but with the OpenAPI "nullable: true" property.

GeoSatelliteld	string	Unique identifier of a GEO satellite. See e.g. clause 5.43.2 in 3GPP TS 23.501 [8].
OffloadIdentifier	string	<p>Offload identifier uniquely identifying a VPLMN offloading policy information instance of the HPLMN (for HR-SBO) or uniquely identifying a Local Offloading Management Policy information instance of the PLMN (for I-SMF based local offloading management).</p> <p>For HR-SBO, it shall comprise the PLMN ID of the HPLMN providing the VPLMN offloading policy and a unique identifier of the VPLMN offloading policy instance in the HPLMN.</p> <p>For I-SMF based Local Offloading management, it shall comprise the PLMN ID of the PLMN providing the local offloading management policy information and a unique identifier of the Local Offloading Management Policy information in this PLMN.</p> <p>The PLMN ID shall be composed of three digits "mcc" followed by "-" and two or three digits "mnc" and shall match the following pattern: '[0-9]{3}-[0-9]{2,3}'</p> <p>The unique identifier shall match the following pattern: '[A-Fa-f0-9]{8}'</p> <p>It may further contain the version number (between 0 and 99) of the VPLMN or Local offloading policy instance in the HPLMN or PLMN. A VPLMN or Local Offloading Information provided by the H-SMF with a higher version number will overwrite the one with lower version number. When present, the version number shall match the following pattern: '-v[0-9]{1,2}'</p> <p>Pattern: '^([0-9]{3}-[0-9]{2,3}-[A-Fa-f0-9]{8})(-v[0-9]{1,2}){0,1}\$'</p> <p>Examples (with and without a version number):</p> <p>"262-01-00A17C01-v3"</p> <p>"302-720-00A17C01"</p>
OpConfiguredCapability	string	The operator configurable capability supported by the UPF.
Satelliteld	string	Unique identifier of a satellite. See e.g. clause 5.4.14 in 3GPP TS 23.501 [8].
EnergySavingIndicator	UInteger	Energy Saving Indicator. See clause 4.2.2.2.2 of 3GPP TS 23.502 [28] and clause 5.51.5 of 3GPP TS 23.501 [8].
OverloadControlInfo	string	<p>String representing the Overload Control Information. The string shall be encoded as the value part of the "Overload Control Information" header defined in clause 5.2.3.2.9 of 3GPP TS 29.500 [25].</p> <p>EXAMPLE: "Timestamp: "Tue, 04 Feb 2020 08:49:37 GMT"; Period-of-Validity: 75s; Overload-Reduction-Metric: 50%; NF-Instance: 54804518-4191-46b3-955c-ac631f953ed8"</p>
<p>NOTE 1: For a PDN connection established via MME/S4-SGSN, the PDU Session ID value is set to 64 plus the EPS bearer ID of the default EPS bearer of the PDN connection; for a PDN connection established via ePDG, the PDU Session ID value is set to 80 plus the EPS bearer ID of the default EPS bearer of the PDN connection; for a PDN connection established via Gn-SGSN, the PDU Session ID value is set to 64 plus the NSAPI of the primary PDP Context of the PDN connection.</p> <p>NOTE 2: When sending a 2-digit MNC value over the SBI interface it can happen that the sender erroneously adds a leading "0". The receiver can detect such error by analysing the MCC value: If only 2-digit MNCs are allocated for the country the MCC is pointing to, then the receiver can remove the leading "0" and continue processing with the 2-digit MNC.</p>		

## 5.4.3 Enumerations

### 5.4.3.1 Enumeration: AccessType

**Table 5.4.3.1-1: Enumeration AccessType**

Enumeration value	Description
"3GPP_ACCESS"	3GPP access
"NON_3GPP_ACCESS"	Non-3GPP access

## 5.4.3.2 Enumeration: RatType

Table 5.4.3.2-1: Enumeration RatType

Enumeration value	Description
"NR"	New Radio
"EUTRA"	(WB) Evolved Universal Terrestrial Radio Access
"WLAN"	Untrusted Wireless LAN (IEEE 802.11) access
"VIRTUAL"	Virtual (see NOTE 1)
"NBIOT"	NB IoT
"WIRELINE"	Wireline access
"WIRELINE_CABLE"	Wireline Cable access
"WIRELINE_BBF"	Wireline BBF access
"LTE-M"	LTE-M (see NOTE 2)
"NR_U"	New Radio in unlicensed bands
"EUTRA_U"	(WB) Evolved Universal Terrestrial Radio Access in unlicensed bands
"TRUSTED_N3GA"	Trusted Non-3GPP access
"TRUSTED_WLAN"	Trusted Wireless LAN (IEEE 802.11) access
"UTRA"	UMTS Terrestrial Radio Access
"GERA"	GSM EDGE Radio Access Network
"NR_LEO"	NR (LEO) satellite access type
"NR_MEO"	NR (MEO) satellite access type
"NR_GEO"	NR (GEO) satellite access type
"NR_OTHER_SAT"	NR (OTHERSAT) satellite access type
"NR_REDCAP"	NR RedCap access type (see NOTE 3)
"WB_E_UTRAN_LEO"	WB-E-UTRAN (LEO) satellite access type
"WB_E_UTRAN_MEO"	WB-E-UTRAN (MEO) satellite access type
"WB_E_UTRAN_GEO"	WB-E-UTRAN (GEO) satellite access type
"WB_E_UTRAN_OTHERSAT"	WB-E-UTRAN (OTHERSAT) satellite access type
"NB_IOT_LEO"	NB-IoT (LEO) satellite access type (NOTE 5)
"NB_IOT_MEO"	NB-IoT (MEO) satellite access type (NOTE 5)
"NB_IOT_GEO"	NB-IoT (GEO) satellite access type (NOTE 5)
"NB_IOT_OTHERSAT"	NB-IoT (OTHERSAT) satellite access type
"LTE_M_LEO"	LTE-M (LEO) satellite access type (NOTE 6)
"LTE_M_MEO"	LTE-M (MEO) satellite access type (NOTE 6)
"LTE_M_GEO"	LTE-M (GEO) satellite access type (NOTE 6)
"LTE_M_OTHERSAT"	LTE-M (OTHERSAT) satellite access type (NOTE 6)
"NR_EREDCAP"	NR eRedCap access type (NOTE 4)
"HSPA_EVOLUTION"	HSPA Evolution
NOTE 1: Virtual shall be used if the N3IWF does not know the access technology used for an untrusted non-3GPP access.	
NOTE 2: This RAT type value is used only in the Core Network; it shall be used when a Category M UE using E-UTRA has provided a Category M indication to the NG-RAN.	
NOTE 3: This RAT type value is used only in the Core Network; it shall be used only for an UE using NR with reduced radio capability (RedCap) provided to the NG-RAN.	
NOTE 4: This RAT type value is used only in the Core Network; it shall be used only for an UE using NR with enhanced reduced radio capability (eRedCap) provided to the NG-RAN.	
NOTE 5: This RAT type value shall not be used as list of restricted RAT when the UDM provide the mobility restriction information to AMF.	
NOTE 6: This RAT type value is used only in the Core Network; it shall be used only to allow the AMF to provide it to MME in the case of mobility from 5GS to EPS.	

## 5.4.3.3 Enumeration: PduSessionType

The enumeration PduSessionType indicates the type of a PDU session. It shall comply with the provisions defined in table 5.4.3.3-1.

**Table 5.4.3.3-1: Enumeration PduSessionType**

Enumeration value	Description
"IPV4"	IPv4
"IPV6"	IPv6
"IPV4V6"	IPv4v6 (see clause 5.8.2.2.1 of 3GPP TS 23.501 [8])
"UNSTRUCTURED"	Unstructured
"ETHERNET"	Ethernet

#### 5.4.3.4 Enumeration: UpIntegrity

The enumeration UpIntegrity indicates whether UP integrity protection is required, preferred or not needed for all the traffic on the PDU Session. It shall comply with the provisions defined in table 5.4.3.4-1.

**Table 5.4.3.4-1: Enumeration UpIntegrity**

Enumeration value	Description
"REQUIRED"	UP integrity protection shall apply for all the traffic on the PDU Session.
"PREFERRED"	UP integrity protection should apply for all the traffic on the PDU Session.
"NOT_NEEDED"	UP integrity protection shall not apply on the PDU Session.

#### 5.4.3.5 Enumeration: UpConfidentiality

The enumeration UpConfidentiality indicates whether UP confidentiality protection is required, preferred or not needed for all the traffic on the PDU Session. It shall comply with the provisions defined in table 5.4.3.5-1.

**Table 5.4.3.5-1: Enumeration UpConfidentiality**

Enumeration value	Description
"REQUIRED"	UP confidentiality protection shall apply for all the traffic on the PDU Session.
"PREFERRED"	UP confidentiality protection should apply for all the traffic on the PDU Session.
"NOT_NEEDED"	UP confidentiality protection shall not apply on the PDU Session.

#### 5.4.3.6 Enumeration: SscMode

The enumeration SscMode represents the service and session continuity mode.

**Table 5.4.3.6-1: Enumeration SscMode**

Enumeration value	Description
"SSC_MODE_1"	see 3GPP TS 23.501 [8]
"SSC_MODE_2"	see 3GPP TS 23.501 [8]
"SSC_MODE_3"	see 3GPP TS 23.501 [8]

#### 5.4.3.7 Enumeration: DnaiChangeType

The enumeration DnaiChangeType represents the type of a DNAI change. A NF service consumer may subscribe to "EARLY", "LATE" or "EARLY\_LATE" types of DNAI change. The types of observed DNAI change the SMF may notify are "EARLY" or "LATE". The DnaiChangeType data type shall comply with the provisions defined in table 5.4.3.7-1.

**Table 5.4.3.7-1: Enumeration DnaiChangeType**

Enumeration value	Description	Applicability
EARLY	Early notification of UP path reconfiguration.	
EARLY_LATE	Early and late notification of UP path reconfiguration. This value shall only be present in the subscription to the DNAI change event.	
LATE	Late notification of UP path reconfiguration.	

#### 5.4.3.8 Enumeration: RestrictionType

**Table 5.4.3.8-1: Enumeration RestrictionType**

Enumeration value	Description
"ALLOWED_AREAS"	This value indicates that areas are allowed.
"NOT_ALLOWED_AREAS"	This value indicates that areas are not allowed.

#### 5.4.3.9 Enumeration: CoreNetworkType

**Table 5.4.3.9-1: Enumeration CoreNetworkType**

Enumeration value	Description
"5GC"	5G Core
"EPC"	Evolved Packet Core

#### 5.4.3.10 Enumeration: AccessTypeRm

This enumeration is defined in the same way as the "AccessType" enumeration, but with the OpenAPI "nullable: true" property.

#### 5.4.3.11 Enumeration: RatTypeRm

This enumeration is defined in the same way as the "RatType" enumeration, but with the OpenAPI "nullable: true" property.

#### 5.4.3.12 Enumeration: PduSessionTypeRm

This enumeration is defined in the same way as the "PduSessionType" enumeration, but with the OpenAPI "nullable: true" property.

#### 5.4.3.13 Enumeration: UpIntegrityRm

This enumeration is defined in the same way as the "UpIntegrity" enumeration, but with the OpenAPI "nullable: true" property.

#### 5.4.3.14 Enumeration: UpConfidentialityRm

This enumeration is defined in the same way as the "UpConfidentiality" enumeration, but with the OpenAPI "nullable: true" property.

#### 5.4.3.15 Enumeration: SscModeRm

This data type is defined in the same way as the "SscMode" enumeration, but with the OpenAPI "nullable: true" property.

#### 5.4.3.17 Enumeration: DnaiChangeTypeRm

This data type is defined in the same way as the "DnaiChangeType" enumeration, but with the OpenAPI "nullable: true" property.

#### 5.4.3.18 Enumeration: RestrictionTypeRm

This data type is defined in the same way as the "RestrictionType" enumeration, but with the OpenAPI "nullable: true" property.

#### 5.4.3.19 Enumeration: CoreNetworkTypeRm

This data type is defined in the same way as the "CoreNetworkType" enumeration, but with the OpenAPI "nullable: true" property.

#### 5.4.3.20 Enumeration: PresenceState

**Table 5.4.3.20-1: Enumeration PresenceState**

Enumeration value	Description
"IN_AREA"	Indicates that the UE is inside or enters the presence reporting area.
"OUT_OF_AREA"	Indicates that the UE is outside or leaves the presence reporting area.
"UNKNOWN"	Indicates it is unknown whether the UE is in the presence reporting area or not.
"INACTIVE"	Indicates that the presence reporting area is inactive in the serving node.

#### 5.4.3.21 Enumeration: StationaryIndication

**Table 5.4.3.21-1: Enumeration StationaryIndication**

Enumeration value	Description
"STATIONARY"	Identifies the UE is stationary
"MOBILE"	Identifies the UE is mobile

#### 5.4.3.22 Enumeration: StationaryIndicationRm

This enumeration is defined in the same way as the "StationaryIndication" enumeration, but with the OpenAPI "nullable: true" property.

#### 5.4.3.23 Enumeration: ScheduledCommunicationType

**Table 5.4.3.23-1: Enumeration ScheduledCommunicationType**

Enumeration value	Description
"DOWNLINK_ONLY"	Downlink only
"UPLINK_ONLY"	Uplink only
"BIDIRECTIONAL"	Bi-directional

#### 5.4.3.24 Enumeration: ScheduledCommunicationTypeRm

This enumeration is defined in the same way as the "ScheduledCommunicationType" enumeration, but with the OpenAPI "nullable: true" property.

## 5.4.3.25 Enumeration: TrafficProfile

Table 5.4.3.25-1: Enumeration TrafficProfile

Enumeration value	Description
"SINGLE_TRANS_UL"	Uplink single packet transmission.
"SINGLE_TRANS_DL"	Downlink single packet transmission.
"DUAL_TRANS_UL_FIRST"	Dual packet transmission, firstly uplink packet transmission with subsequent downlink packet transmission.
"DUAL_TRANS_DL_FIRST"	Dual packet transmission, firstly downlink packet transmission with subsequent uplink packet transmission.
"MULTI_TRANS"	Multiple packet transmission.

## 5.4.3.26 Enumeration: TrafficProfileRm

This enumeration is defined in the same way as the "TrafficProfile" enumeration, but with the OpenAPI "nullable: true" property.

## 5.4.3.27 Enumeration: LcsServiceAuth

Table 5.4.3.27-1: Enumeration LcsServiceAuth

Enumeration value	Description
"LOCATION_ALLOWED_WITH_NOTIFICATION"	Location allowed with notification
"LOCATION_ALLOWED_WITHOUT_NOTIFICATION"	Location allowed without notification
"LOCATION_ALLOWED_WITHOUT_RESPONSE"	Location with notification and privacy verification; location allowed if no response
"LOCATION_RESTRICTED_WITHOUT_RESPONSE"	Location with notification and privacy verification; location restricted if no response
"NOTIFICATION_ONLY"	Notification only
"NOTIFICATION_AND_VERIFICATION_ONLY"	Notification and privacy verification only

## 5.4.3.28 Enumeration: UeAuth

Table 5.4.3.28-1: Enumeration UeAuth

Enumeration value	Description
"AUTHORIZED"	Indicates that the UE is authorized.
"NOT_AUTHORIZED"	Indicates that the UE is not authorized.

## 5.4.3.29 Enumeration: DIDataDeliveryStatus

**Table 5.4.3.29-1: Enumeration DIDataDeliveryStatus**

Enumeration value	Description
"BUFFERED"	The first downlink data is buffered with extended buffering matching the source of the downlink traffic.
"TRANSMITTED"	The first downlink data matching the source of the downlink traffic is transmitted after previous buffering or discarding of corresponding packet(s) because the UE of the PDU Session becomes ACTIVE, and buffered data can be delivered to UE.
"DISCARDED"	The first downlink data matching the source of the downlink traffic is discarded because the Extended Buffering time, as determined by the SMF, expires or the amount of downlink data to be buffered is exceeded.

## 5.4.3.30 Enumeration: DIDataDeliveryStatusRm

This enumeration is defined in the same way as the "DIDataDeliveryStatus" enumeration, but with the OpenAPI "nullable: true" property.

## 5.4.3.31 Void

## 5.4.3.32 Enumeration: AuthStatus

**Table 5.4.3.32-1: Enumeration AuthStatus**

Enumeration value	Description
"EAP_SUCCESS"	The NSSAA status is EAP-Success.
"EAP_FAILURE"	The NSSAA status is EAP-Failure.
"PENDING"	The NSSAA status is Pending, i.e. the NSSAA procedure is ongoing.

## 5.4.3.33 Enumeration: LineType

**Table 5.4.3.33-1: Enumeration LineType**

Enumeration value	Description
"DSL"	DSL line
"PON"	PON line

## 5.4.3.34 Enumeration: LineTypeRm

This enumeration is defined in the same way as the "LineType" enumeration, but with the OpenAPI "nullable: true" property.

5.4.3.35 Void

5.4.3.36 Void

5.4.3.37 Enumeration: NotificationFlag

**Table 5.4.3.37-1: Enumeration NotificationFlag**

Enumeration value	Description	Applicability
ACTIVATE	The event notification is activated.	
DEACTIVATE	The event notification is deactivated and shall be muted. The available event(s) shall be stored.	
RETRIEVAL	The event notification shall be sent to the NF service consumer(s), after that, is muted again. (See NOTE)	
NOTE: The value "RETRIEVAL" shall not be provided during the creating subscription procedure.		

5.4.3.38 Enumeration: TransportProtocol

**Table 5.4.3.38-1: Enumeration TransportProtocol**

Enumeration value	Description
"UDP"	User Datagram Protocol
"TCP"	Transmission Control Protocol

5.4.3.39 Enumeration: SatelliteBackhaulCategory

**Table 5.4.3.39-1: Enumeration SatelliteBackhaulCategory**

Enumeration value	Description
"GEO"	Indicates Geostationary satellite backhaul category.
"MEO"	Indicates Medium Earth Orbit satellite backhaul category.
"LEO"	Indicates Low Earth Orbit satellite backhaul category.
"OTHER_SAT"	Indicates other satellite backhaul category.
"DYNAMIC_GEO"	Indicates dynamic Geostationary satellite backhaul category.
"DYNAMIC_MEO"	Indicates dynamic Medium Earth Orbit satellite backhaul category.
"DYNAMIC_LEO"	Indicates dynamic Low Earth Orbit satellite backhaul category.
"DYNAMIC_OTHER_SAT"	Indicates dynamic other satellite backhaul category.
"NON_SATELLITE"	Indicates non satellite backhaul. (NOTE)
NOTE:	This value indicates that there is no longer any satellite backhaul towards the 5G AN currently serving the UE.

5.4.3.40 Enumeration: SatelliteBackhaulCategoryRm

This data type is defined in the same way as the "SatelliteBackhaulCategory" data type, but with the OpenAPI "nullable: true" property.

## 5.4.3.41 Enumeration: BufferedNotificationsAction

Table 5.4.3.41-1: Enumeration BufferedNotificationsAction

Enumeration value	Description
"SEND_ALL"	The NF Service Producer should send all the reports of the stored events to the NF service consumer.
"DISCARD_ALL"	The NF Service Producer should discard all the reports of the stored events for the NF service consumer.
"DROP_OLD"	The NF Service Producer should drop the old reports of the stored events for the NF service consumer when new event reports need to be stored.

## 5.4.3.42 Enumeration: SubscriptionAction

Table 5.4.3.42-1: Enumeration SubscriptionAction

Enumeration value	Description
"CLOSE"	The subscription to the event notification should be terminated if an exception occurs at the NF Service Producer.
"CONTINUE_WITH_MUTING"	The subscription to the event notification should be continued with muting if an exception occurs at the NF Service Producer.
"CONTINUE_WITHOUT_MUTING"	The subscription to the event notification should be continued without muting if an exception occurs at the NF Service Producer.

## 5.4.3.43 Enumeration: SnsaiStatus

Table 5.4.3.43-1: Enumeration SnsaiStatus

Enumeration value	Description
"AVAILABLE"	This value is used when the S-NSSAI becomes available.
"UNAVAILABLE"	This value is used when the S-NSSAI becomes unavailable.

## 5.4.3.44 Enumeration: TerminationIndication

Table 5.4.3.44-1: Enumeration TerminationIndication

Enumeration value	Description
"NEW_UES_TERMINATION"	It indicates that Network Slice Replacement is terminated for new UEs.
"ALL_UES_TERMINATION"	It indicates that Network Slice Replacement is terminated for all UEs and PDU sessions shall move back from the alternative S-NSSAI to the S-NSSAI.

## 5.4.3.45 Enumeration: DelayMeasurementProtocol

Table 5.4.3.45-1: Enumeration DelayMeasurementProtocol

Enumeration value	Description
"TWAMP"	A Two-Way Active Measurement Protocol (see IETF RFC 5357 [69])
"OWAMP"	A One-way Active Measurement Protocol (see IETF RFC 4656 [70])
"STAMP"	Simple Two-Way Active Measurement Protocol (see IETF RFC 8762 [71])
"OTHER"	Measurement protocol for which no specific value exists in this enumeration

## 5.4.3.46 Enumeration: CagProvisionOperation

Table 5.4.3.46-1: Enumeration CagProvisionOperation

Enumeration value	Description
"ADD"	To add/append the indicated CAG ID list to the previously configured CAG ID list (if any).
"REPLACE"	To replace the previously configured CAG ID list (if any) with the newly provisioned CAG ID list.
"REMOVE"	To remove the indicated CAG ID list from the previously configured CAG ID list.

## 5.4.4 Structured Data Types

## 5.4.4.1 Type: SubscribedDefaultQos

Table 5.4.4.1-1: Definition of type SubscribedDefaultQos

Attribute name	Data type	P	Cardinality	Description
5qi	5Qi	M	1	Default 5G QoS identifier see 3GPP TS 23.501 [8] clause 5.7.2.7.
arp	Arp	M	1	Default Allocation and Retention Priority see 3GPP TS23.501 [8] clause 5.7.2.7.
priorityLevel	5QiPriorityLevel	O	0..1	Defines the 5QI Priority Level. When present, it contains the 5QI Priority Level value that overrides the standardized or pre-configured value as described in 3GPP TS 23.501 [8].

## 5.4.4.2 Type: Sns sai

Table 5.4.4.2-1: Definition of type Sns sai

Attribute name	Data type	P	Cardinality	Description
sst	integer	M	1	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. Values 0 to 127 correspond to the standardized SST range. Values 128 to 255 correspond to the Operator-specific range. See clause 28.4.2 of 3GPP TS 23.003 [7]. Standardized values are defined in clause 5.15.2.2 of 3GPP TS 23.501 [8].
sd	string	O	0..1	3-octet string, representing the Slice Differentiator, in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the SD shall appear first in the string, and the character representing the 4 least significant bit of the SD shall appear last in the string.  This is an optional parameter that complements the Slice/Service type(s) to allow to differentiate amongst multiple Network Slices of the same Slice/Service type. This IE shall be absent if no SD value is associated with the SST.  Pattern: '[A-Fa-f0-9]{6}\$'

When Sns sai needs to be converted to string (e.g. when used in maps as key), the string shall be composed of one to three digits "sst" optionally followed by "-" and 6 hexadecimal digits "sd", and shall match the following pattern:

$^([0-9][1-9][0-9]|1[0-9][0-9]|2([0-4][0-9]|5[0-5]))(-[A-Fa-f0-9]{6})?^$$

Example 1: "255-19CDE0"

Example 2: "29"

## 5.4.4.3 Type: PlmnId

Table 5.4.4.3-1: Definition of type PlmnId

Attribute name	Data type	P	Cardinality	Description
mcc	Mcc	M	1	Mobile Country Code
mnc	Mnc	M	1	Mobile Network Code

When PlmnId needs to be converted to string (e.g. when used in maps as key), the string shall be composed of three digits "mcc" followed by "-" and two or three digits "mnc", and shall match the following pattern:

$^[0-9]{3}-[0-9]{2,3}^$$

Example 1: "262-01"

Example 2: "302-720"

## 5.4.4.4 Type: Tai

Table 5.4.4.4-1: Definition of type Tai

Attribute name	Data type	P	Cardinality	Description
plmnId	PlmnId	M	1	PLMN Identity
tac	Tac	M	1	Tracking Area Code
nid	Nid	O	0..1	Network Identifier, shall be present in case of SNPN, PlmnId together with Nid indicates the identity of the SNPN to which the TA belongs to.

NOTE: The "nid" attribute is used to convey the Network Identifier (NID) of the SNPN as part of the "Tai" JSON object data type definition; this is a protocol aspect that does not imply any change on the system-wide definition of the TAI, as described in 3GPP 23.003 [7].

## 5.4.4.5 Type: Ecgi

Table 5.4.4.5-1: Definition of type Ecgi

Attribute name	Data type	P	Cardinality	Description
plmnId	PlmnId	M	1	PLMN Identity
eutraCellId	EutraCellId	M	1	E-UTRA Cell Identity
nid	Nid	O	0..1	Network Identifier

NOTE: The "nid" attribute is used to convey the Network Identifier (NID) of the SNPN as part of the "Ecgi" JSON object data type definition; this is a protocol aspect that does not imply any change on the system-wide definition of the ECGI, as described in 3GPP 23.003 [7].

## 5.4.4.6 Type: Ncgi

Table 5.4.4.6-1: Definition of type Ncgi

Attribute name	Data type	P	Cardinality	Description
plmnId	PlmnId	M	1	PLMN Identity
nrCellId	NrCellId	M	1	NR Cell Identity
nid	Nid	C	0..1	Network Identifier, shall be present in case of SNPN, PlmnId together with Nid indicates the identity of the SNPN to which the NR cell belongs to.

NOTE: The "nid" attribute is used to convey the Network Identifier (NID) of the SNPN as part of the "Ncgi" JSON object data type definition; this is a protocol aspect that does not imply any change on the system-wide definition of the NCGI, as described in 3GPP 23.003 [7].

## 5.4.4.7 Type: UserLocation

Table 5.4.4.7-1: Definition of type UserLocation

Attribute name	Data type	P	Cardinality	Description
eutraLocation	EutraLocation	C	0..1	E-UTRA user location (see NOTE).
nrLocation	NrLocation	C	0..1	NR user location (see NOTE).
n3gaLocation	N3gaLocation	C	0..1	Non-3GPP access user location (see NOTE).
utraLocation	UtraLocation	C	0..1	UTRAN access user location (see NOTE).
geraLocation	GeraLocation	C	0..1	GERAN access user location (see NOTE).
NOTE: At least one of eutraLocation, nrLocation, n3gaLocation, utraLocation and geraLocation shall be present. Several of them may be present.				

## 5.4.4.8 Type: EutraLocation

Table 5.4.4.8-1: Definition of type EutraLocation

Attribute name	Data type	P	Cardinality	Description
tai	Tai	M	1	Tracking Area Identity. The TAC of the TAI shall be set to one reserved value (e.g. 0x0000, see clause 19.4.2.3 of 3GPP TS 23.003 [7]) if the TAI information is not available.
ignoreTai	boolean	O	0..1	This flag when present shall indicate that the Tai shall be ignored. When present, it shall be set as follows: - true: tai shall be ignored. - false (default): tai shall not be ignored.
ecgi	Ecgi	M	1	E-UTRA Cell Identity
ignoreEcgi	boolean	O	0..1	This flag when present shall indicate that the Ecgi shall be ignored. When present, it shall be set as follows: - true: ecgi shall be ignored. - false (default): ecgi shall not be ignored.
ageOfLocationInformation	integer	O	0 1	The value represents the elapsed time in minutes since the last network contact of the mobile station. Value "0" indicates that the location information was obtained after a successful paging procedure for Active Location Retrieval when the UE is in idle mode or after a successful NG-RAN location reporting procedure with the eNB when the UE is in connected mode. Any other value than "0" indicates that the location information is the last known one. See 3GPP TS 29.002 [21] clause 17.7.8.
ueLocationTimestamp	DateTime	O	0..1	The value represents the UTC time when the UeLocation information was acquired.
geographicalInformation	string	O	0..1	Refer to geographical Information. See 3GPP TS 23.032 [23] clause 7.3.2. Only the description of an ellipsoid point with uncertainty circle is allowed to be used. Allowed characters are 0-9 and A-F;
geodeticInformation	string	O	0..1	Refers to Calling Geodetic Location. See ITU-T Recommendation Q.763 (1999) [24] clause 3.88.2. Only the description of an ellipsoid point with uncertainty circle is allowed to be used. Allowed characters are 0-9 and A-F.
globalNgenbld	GlobalRanNodeBId	O	0..1	It indicates the global identity of the ng-eNodeB in which the UE is currently located. See 3GPP TS 38.413 [11] clause 9.3.1.8.
globalENbld	GlobalRanNodeBId	O	0..1	It indicates the global identity of the eNodeB in which the UE is currently located. See 3GPP TS 36.413 [16] clause 9.2.1.37.
NOTE:	Either the "globalNgenbld" attribute or the "globalENbld" attribute shall be included in the "EutraLocation" data type.			

## 5.4.4.9 Type: NrLocation

Table 5.4.4.9-1: Definition of type NrLocation

Attribute name	Data type	P	Cardinality	Description
tai	Tai	M	1	Tracking Area Identity  When NTN TAI Information with UE Location Derived TAC was received from satellite NG-RAN, this IE shall carry the value of the UE Location Derived TAC; if NTN TAI Information without UE Location Derived TAC was received, this IE shall carry the value of the first TAC that is not restricted to the UE, in the list of TAC(s) broadcast in the cell.
ncgi	Ncgi	M	1	NR Cell Identity
ignoreNcgi	boolean	O	0..1	This flag when present shall indicate that the Ncgi shall be ignored. When present, it shall be set as follows: - true: ncgi shall be ignored. - false (default): ncgi shall not be ignored.
ageOfLocationInformation	integer	O	0..1	The value represents the elapsed time in minutes since the last network contact of the mobile station. Value "0" indicates that the location information was obtained after a successful paging procedure for Active Location Retrieval when the UE is in idle mode or after a successful NG-RAN location reporting procedure with the gNB when the UE is in connected mode. Any other value than "0" indicates that the location information is the last known one. See 3GPP TS 29.002 [21] clause 17.7.8.
ueLocationTimestamp	DateTime	O	0..1	The value represents the UTC time when the UeLocation information was acquired.
geographicalInformation	string	O	0..1	Refer to geographical Information. See 3GPP TS 23.032 [23] clause 7.3.2. Only the description of an ellipsoid point with uncertainty circle is allowed to be used. Allowed characters are 0-9 and A-F;
geodeticInformation	string	O	0..1	Refers to Calling Geodetic Location. See ITU-T Recommendation Q.763 (1999) [24] clause 3.88.2. Only the description of an ellipsoid point with uncertainty circle is allowed to be used. Allowed characters are 0-9 and A-F.
globalGnbld	GlobalRanNodeBld	O	0..1	It indicates the global identity of the gNodeB in which the UE is currently located. See 3GPP TS 38.413 [11] clause 9.3.1.6.
ntnTailInfo	NtnTailInfo	O	0..1	Contains NR NTN TAI Information.  When this IE is present and supported, the tai attribute shall be ignored by the receiver, see clause 9.3.3.53 of 3GPP TS 38.413 [11].

5.4.4.10 Type: N3gaLocation

**Table 5.4.4.10-1: Definition of type N3gaLocation**

Attribute name	Data type	P	Cardinality	Description
n3gppTai	Tai	C	0..1	This IE shall be present over the 3GPP PLMN internal interfaces, but it shall not be present over the N5 interface, nor on the N7/N40 interface in EPC interworking scenario. When present, it shall contain the TAI reported by the N3IWF, TNGF, TWIF or W-AGF for the non-3GPP access.
n3lwfld	string	C	0..1	This IE shall contain the N3IWF identifier received over NGAP and shall be encoded as a string of hexadecimal characters. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the N3IWF ID shall appear first in the string, and the character representing the 4 least significant bit of the N3IWF ID shall appear last in the string.  Pattern: '^[A-Fa-f0-9]+\$'  Example: The N3IWF Id 0x5BD6 shall be encoded as "5BD6".  It shall be present over the 3GPP PLMN internal interfaces if the UE is accessing the 5GC via an untrusted non-3GPP access, but shall not be present over the N5 interface, nor on the N7/N40 interface in EPC interworking scenario.
uelpv4Addr	Ipv4Addr	C	0..1	UE/N5CW device local IPv4 address (used to reach the N3IWF, TNGF or TWIF, or ePDG). The uelpv4Addr or the uelpv6Addr shall be present if the UE is accessing the 5GC via a trusted or untrusted non-3GPP access and the information is available.
uelpv6Addr	Ipv6Addr	C	0..1	UE/N5CW device local IPv6 address (used to reach the N3IWF, TNGF or TWIF, or ePDG). The uelpv4Addr or the uelpv6Addr shall be present if the UE is accessing the 5GC via a trusted or untrusted non-3GPP access and the information is available.
portNumber	UInteger	C	0..1	UDP or TCP source port number. It shall be present if the UE/N5CW is accessing the 5GC via a trusted or untrusted non-3GPP access and NAT is detected and the information is available.
protocol	TransportProtocol	O	0..1	This IE may be present if portNumber is present.  When present, this IE shall indicate the transport protocol used by the UE to access the core network via a trusted or untrusted non-3GPP access and NAT is detected.  The absence of this IE indicates that the transport protocol used by the UE to access the core network via a trusted or untrusted non-3GPP access is not specified, i.e. could be UDP or TCP.
tnapId	TnapId	C	0..1	This IE shall contain the TNAP Identifier, see clause 5.6.2 of 3GPP TS 23.501 [8].
twapId	TwapId	C	0..1	In the scenario of accessing 5GC from N5CW device, this IE shall contain the TWAP Identifier, see clause 4.2.8.5.3 of 3GPP TS 23.501 [8]. In the scenario of interworking between ePDG/EPC and 5GS, this IE shall contain the WLAN location information, see clause 4.5.7.2.8 of 3GPP TS 23.402 [48].

hfcNodeId	HfcNodeId	C	0..1	This IE shall contain the HFC Node Identifier received over NGAP. It shall be present for a 5G-CRG/FN-CRG accessing the 5GC via wireline access network, and for a AUN3 device connected behind the 5G-CRG (see clause 7.2.8.1 of 3GPP TS 23.316 [30]).
gli	Gli	C	0..1	This IE shall contain the Global Line Identifier. It shall be present for a 5G-BRG/FN-BRG accessing the 5GC via wireline access network, and for a AUN3 device connected behind a 5G-BRG.
w5gbanLineType	LineType	O	0..1	This IE may be present for a 5G-BRG/FN-BRG accessing the 5GC via wireline access network. When present, it shall indicate the type of the wireline (DSL or PON).
gci	Gci	C	0..1	This IE shall contain the Global Cable Identifier. It shall be present for the N5GC device accessing the 5GC via wireline access network(see clause 4.10a of 3GPP TS 23.316 [30]), and for a AUN3 device connected behind the 5G-CRG (see clause 7.2.8.1 of 3GPP TS 23.316 [30]).

#### 5.4.4.11 Type: UpSecurity

**Table 5.4.4.11-1: Definition of type UpSecurity**

Attribute name	Data type	P	Cardinality	Description
upIntegr	UpIntegrity	M	1	This IE shall indicate whether UP integrity protection is required, preferred or not needed for all the traffic on the PDU Session.
upConfid	UpConfidentiality	M	1	This IE shall indicate whether UP confidentiality protection is required, preferred or not needed for all the traffic on the PDU Session.

#### 5.4.4.12 Type: NgApCause

**Table 5.4.4.12-1: Definition of type NgApCause**

Attribute name	Data type	P	Cardinality	Description
group	UInteger	M	1	This IE shall indicate the group of the NGAP cause. The value of this IE shall equal to the ASN.1 value of the specified NGAP cause group.  NGAP supports following cause groups defined as separate enumerations, as specified in clause 9.4.5 of 3GPP TS 38.413 [11], with following values:  0 – radioNetwork 1 – transport 2 – nas 3 – protocol 4 – misc
value	UInteger	M	1	This IE shall carry the NG AP cause value in specific cause group identified by the "group" attribute, as specified in clause 9.4.5 of 3GPP TS 38.413 [11].

## 5.4.4.13 Type: BackupAmfInfo

Table 5.4.4.13-1: Definition of type BackupAmfInfo

Attribute name	Data type	P	Cardinality	Description
backupAmf	AmfName	M	1	This IE shall contain the AMF name of the backup AMF that can serve the specific GUAMI(s) supported by the primary AMF (see clause 5.21.2.3 of 3GPP TS 23.501 [8]).
guamiList	array(Guami)	C	1..N	If present, this IE shall contain the list of GUAMI(s) (supported by the primary AMF) which the backup AMF can serve.  If this IE is absent, it indicates that the backup AMF can serve all the GUAMI(s) supported by the primary AMF.

## 5.4.4.14 Type: RefToBinaryData

Table 5.4.4.14-1: Definition of type RefToBinaryData

Attribute name	Data type	P	Cardinality	Description
contentId	string	M	1	This IE shall contain the value of the Content-ID header of the referenced binary body part.

## 5.4.4.15 Type RouteToLocation

Table 5.4.4.15-1: Definition of type RouteToLocation

Attribute name	Data type	P	Cardinality	Description
dnai	Dnai	M	1	Identifies the location of the application.
routeInfo	RouteInformation	C	0..1	Includes the traffic routing information.
routeProfileId	string	C	0..1	Identifies the routing profile Id.
NOTE: At least one of the "routeInfo" attribute and the "routeProfileId" attribute shall be included in the "RouteToLocation" data type..				

## 5.4.4.16 Type RouteInformation

Table 5.4.4.16-1: Definition of type RouteInformation

Attribute name	Data type	P	Cardinality	Description
ipv4Addr	Ipv4Addr	C	0..1	Ipv4 address of the tunnel end point in the data network.
ipv6Addr	Ipv6Addr	C	0..1	Ipv6 address of the tunnel end point in the data network.
portNumber	UInteger	M	1	UDP port number of the tunnel end point in the data network.
NOTE: At least one of the "ipv4Addr" attribute and the "ipv6Addr" attribute shall be included in the "RouteInformation" data type.				

## 5.4.4.17 Type: Area

Table 5.4.4.17-1: Definition of type Area

Attribute name	Data type	P	Cardinality	Description
tacs	array(Tac)	C	1..N	List of TACs; shall be present if and only if areaCode is absent.
areaCode	AreaCode	C	0..1	Area Code; shall be present if and only if tacs is absent.

## 5.4.4.18 Type: ServiceAreaRestriction

Table 5.4.4.18-1: Definition of type ServiceAreaRestriction

Attribute name	Data type	P	Cardinality	Description
restrictionType	RestrictionType	C	0..1	string "ALLOWED_AREAS" or "NOT_ALLOWED_AREAS" shall be present if and only if the areas attribute is present
areas	array(Area)	O	0..N (NOTE)	A list of Areas. These areas are: - allowed areas if RestrictionType is "ALLOWED_AREAS" - not allowed areas if RestrictionType is "NOT_ALLOWED_AREAS"
maxNumOfTAs	UInteger	C	0..1	Maximum number of allowed tracking areas for use when restrictionType indicates "ALLOWED_AREAS". This attribute shall be absent when attribute "restrictionType" takes the value "NOT_ALLOWED_AREAS".
maxNumOfTAsForNotAllowedAreas	UInteger	C	0..1	Maximum number of allowed tracking areas for use when restrictionType indicates "NOT_ALLOWED_AREAS". This attribute shall be absent when attribute "restrictionType" takes the value "ALLOWED_AREAS".
NOTE: The empty array is used when service is allowed/restricted nowhere.				

## 5.4.4.19 Type: PlmnIdRm

This data type is defined in the same way as the "PlmnId" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.20 Type: TaiRm

This data type is defined in the same way as the "Tai" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.21 Type: EcgiRm

This data type is defined in the same way as the "Ecgi" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.22 Type: NcgiRm

This data type is defined in the same way as the "Ncgi" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.23 Type: EutraLocationRm

This data type is defined in the same way as the "EutraLocation" data type, but with the OpenAPI "nullable: true" property.

#### 5.4.4.24 Type: NrLocationRm

This data type is defined in the same way as the "NrLocation" data type, but with the OpenAPI "nullable: true" property.

#### 5.4.4.25 Type: UpSecurityRm

This data type is defined in the same way as the "UpSecurity" data type, but with the OpenAPI "nullable: true" property.

#### 5.4.4.26 Type: RefToBinaryDataRm

This data type is defined in the same way as the "RefToBinaryData" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.27 Type: PresenceInfo

Table 5.4.4.27-1: Definition of type PresenceInfo

Attribute name	Data type	P	Cardinality	Description
prald	string	C	0..1	Represents an identifier of the Presence Reporting Area (see clause 28.10 of 3GPP TS 23.003 [7]). This IE shall be present if the Area of Interest subscribed or reported is a Presence Reporting Area or a Set of Core Network predefined Presence Reporting Areas.  When present, it shall be encoded as a string representing an integer in the following ranges: 0 to 8 388 607 for UE-dedicated PRA 8 388 608 to 16 777 215 for Core Network predefined PRA. Examples: PRA ID 123 is encoded as "123" PRA ID 11 238 660 is encoded as "11238660"
additionalPrald	string	C	0..1	This IE may be present if the prald IE is present and if it contains a PRA identifier referring to a set of Core Network predefined Presence Reporting Areas.  When present, this IE shall contain a PRA Identifier of an individual PRA within the Set of Core Network predefined Presence Reporting Areas indicated by the prald IE.
presenceState	PresenceState	C	0..1	Indicates whether the UE is inside or outside of the area of interest (e.g presence reporting area or the LADN area), or if the presence reporting area is inactive in the serving node. (NOTE)
trackingAreaList	array(Tai)	C	1..N	Represents the list of tracking areas that constitutes the area. This IE shall be present if the subscription or the event report is for tracking UE presence in the tracking areas. For non 3GPP access the TAI shall be the N3GPP TAI.
ecgiList	array(Ecgi)	C	1..N	Represents the list of EUTRAN cell Ids that constitutes the area. This IE shall be present if the Area of Interest subscribed is a list of EUTRAN cell Ids.
ncgiList	array(Ncgi)	C	1..N	Represents the list of NR cell Ids that constitutes the area. This IE shall be present if the Area of Interest subscribed is a list of NR cell Ids.
globalRanNodeIdList	array(GlobalRanNodeId)	C	1..N	Represents the list of NG RAN node identifiers that constitutes the area. This IE shall be present if the Area of Interest subscribed is a list of NG RAN node identifiers.
globaleNbIdList	array(GlobalRanNodeId)	C	1..N	Represents the list of eNodeB identifiers that constitutes the area. This IE shall be present if the Area of Interest subscribed is a list of eNodeB identifiers.
NOTE:	If the additionalPrald IE is present, this IE shall state the presence information of the UE for the individual PRA identified by the additionalPrald IE; If the additionalPrald IE is not present, this IE shall state the presence information of the UE for the PRA identified by the prald IE.			

## 5.4.4.28 Type: GlobalRanNodeId

Table 5.4.4.28-1: Definition of type GlobalRanNodeId

Attribute name	Data type	P	Cardinality	Description
plmnId	PlmnId	M	1	Indicates the identity of the PLMN that the RAN node belongs to.
n3IwfId	N3IwfId	C	0..1	This IE shall be included if the AN node represents a N3IWF. When present, this IE shall contain the identifier of the N3IWF. (NOTE 1).
gNbId	GNbId	C	0..1	This IE shall be included if the RAN Node Id represents a gNB. When present, this IE shall contain the identifier of the gNB. (NOTE 1).
ngeNbId	NgeNbId	C	0..1	This IE shall be included if the RAN Node Id represents a NG-eNB. When present, this IE shall contain the identifier of an NG-eNB. (NOTE 1).
wagfId	WAgfId	C	0..1	This IE shall be included if the AN node represents a W-AGF. When present, this IE shall contain the identifier of the W-AGF. (NOTE 1).
tngfId	TngfId	C	0..1	This IE shall be included if the AN node represents a TNGF. When present, this IE shall contain the identifier of the TNGF. (NOTE 1).
nId	Nid	O	0..1	Network Identifier shall be present in case of SNPN, PlmnId together with Nid indicates the identity of the SNPN to which the RanNode belongs to.
eNbId	ENbId	C	0..1	This IE shall be included if the RAN Node Id represents an eNB. When present, this IE shall contain the identifier of an eNB. (NOTE 1, NOTE 2).
NOTE 1: One of the six attributes n3IwfId, gNbId, ngeNbId, wagfId, tngfId, eNbId shall be present.				
NOTE 2: For UEs with 5GS subscription but without 5G NAS support, eNbId is used on N7 instead of n3IwfId, gNbId, ngeNbId.				

## 5.4.4.29 Type: GNbId

Table 5.4.4.29-1: Definition of type GNbId

Attribute name	Data type	P	Cardinality	Description
bitLength	integer	M	1	Unsigned integer representing the bit length of the gNB ID as defined in clause 9.3.1.6 of 3GPP TS 38.413 [11], within the range 22 to 32
gNBValue	string	M	1	<p>This represents the identifier of the gNB.</p> <p>The string shall be formatted with following pattern: <code>^[A-Fa-f0-9]{6,8}\$</code></p> <p>The value of the gNB ID shall be encoded in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The padding 0 shall be added to make multiple nibbles, the most significant character representing the padding 0 if required together with the 4 most significant bits of the gNB ID shall appear first in the string, and the character representing the 4 least significant bit of the gNB ID shall appear last in the string.</p> <p>Examples:  A 30 bit value "382A3F47" indicates a gNB ID with value 0x382A3F47  A 22 bit value "2A3F47" indicates a gNB ID with value 0x2A3F47</p>

## 5.4.4.30 Type: PresenceInfoRm

This data type is defined in the same way as the "PresenceInfo" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.31 Void

## 5.4.4.32 Type: AtsssCapability

Table 5.4.4.32-1: Definition of type AtsssCapability

Attribute name	Data type	P	Cardinality	Description
atsssLL	boolean	O	0..1	Indicates the support of Access Traffic Steering, Switching and Splitting procedures using the ATSSS-LL steering functionality (see clauses 4.2.10, 5.32 of 3GPP TS 23.501 [8]). true: Supported false (default): Not Supported
mptcp	boolean	O	0..1	Indicates the support of Access Traffic Steering, Switching and Splitting procedures using the MPTCP steering functionality (see clauses 4.2.10, 5.32 of 3GPP TS 23.501 [8]). true: Supported false (default): Not Supported
mpquic	boolean	O	0..1	Indicates the support of Access Traffic Steering, Switching and Splitting procedures using the MPQUIC-UDP steering functionality (see clauses 4.2.10, 5.32 of 3GPP TS 23.501 [8]). true: Supported false (default): Not Supported
rttWithoutPmf	boolean	O	0..1	This IE is only used by the UPF to indicate whether the UPF supports RTT measurement without PMF (see clauses 5.32.2, 6.3.3.3 of 3GPP TS 23.501 [8]). If this attribute is present and set to true, the mptcp attribute shall also be present and set to true.  true: Supported false (default): Not Supported.
mpquicIp	boolean	O	0..1	Indicates the support of Access Traffic Steering, Switching and Splitting procedures using the MPQUIC-IP steering functionality (see clauses 4.2.10, 5.32 of 3GPP TS 23.501 [8]). true: Supported false (default): Not Supported
mpquicE	boolean	O	0..1	Indicates the support of Access Traffic Steering, Switching and Splitting procedures using the MPQUIC-E steering functionality (see clauses 4.2.10, 5.32 of 3GPP TS 23.501 [8]). true: Supported false (default): Not Supported

## 5.4.4.33 Type: PlmnIdNid

Table 5.4.4.33-1: Definition of type PlmnIdNid

Attribute name	Data type	P	Cardinality	Description
mcc	Mcc	M	1	Mobile Country Code
mnc	Mnc	M	1	Mobile Network Code
nid	Nid	C	0..1	Network Identity; Shall be present if PlmnIdNid identifies an SNPN (see clauses 5.30.2.3, 5.30.2.9, 6.3.4, and 6.3.8 in 3GPP TS 23.501 [2]). Otherwise, this attribute shall be absent.

When PlmnIdNid needs to be converted to string (e.g. when used in maps as key), the string shall be composed of three digits "mcc" followed by "-" and two or three digits "mnc" followed by "-" and 11 digits "nid", and shall match the following pattern:

```
^[0-9]{3}-[0-9]{2,3}-[A-Fa-f0-9]{11}$
```

Example 1: "262-01-000007ed9d5"

Example 2: "302-720-000007ed9d5"

#### 5.4.4.34 Type: PlmnIdNidRm

This data type is defined in the same way as the "PlmnIdNid" data type, but with the OpenAPI "nullable: true" property.

#### 5.4.4.35 Type: SmallDataRateStatus

**Table 5.4.4.35-1: Definition of type SmallDataRateStatus**

Attribute name	Data type	P	Cardinality	Description
remainPacketsUl	integer	C	0..1	This IE shall be included if available. When present, it shall contain the number of packets the UE is allowed to send uplink in the given time unit for the given PDU session (see clause 5.31.14.3 of 3GPP TS 23.501 [8]).
remainPacketsDl	integer	C	0..1	This IE shall be included if available. When present it shall contain the number of packets the AF is allowed to send downlink in the given time unit for the given PDU session (see clause 5.31.14.3 of 3GPP TS 23.501 [8]).
validityTime	DateTime	C	0..1	This IE shall be included if available. When present, it shall indicate the period of time during which the small data rate control status will remain valid (see clause 5.31.14.3 of 3GPP TS 23.501 [8]).
remainExReportsUl	integer	C	0..1	This IE shall be included if available. When present, it shall indicate number of additional exception reports the UE is allowed to send uplink in the given time unit for the given PDU session (see clause 5.31.14.3 of 3GPP TS 23.501 [8]).
remainExReportsDl	integer	C	0..1	This IE shall be included if available. When present, it shall indicate number of additional exception reports the AF is allowed to send downlink in the given time unit for the given PDU session (see clause 5.31.14.3 in 3GPP TS 23.501 [8]).

#### 5.4.4.36 Type: HfcNodeId

**Table 5.4.4.36-1: Definition of type HfcNodeId**

Attribute name	Data type	P	Cardinality	Description	Applicability
hfcNid	HfcNid	M	1	HFC Node Id.	

#### 5.4.4.37 Type: HfcNodeIdRm

This data type is defined in the same way as the "HfcNodeId" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.38 Type: WirelineArea

Table 5.4.4.38-1: Definition of type WirelineArea

Attribute name	Data type	P	Cardinality	Description	Applicability
globalLineIds	array(Gli)	C	1..N	List of Global Line Identifiers, for a 5G-BRG or an AUN3 device behind 5G-BRG accessing the 5GC via wireline access network.	
hfcNIds	array(HfcNId)	C	1..N	List of HFC Node Ids, for a 5G-CRG/FN-CRG is accessing the 5GC via wireline access network.	
areaCodeB	AreaCode	C	0..1	Area Code for 5G-BRG or an AUN3 device behind 5G-BRG accessing via wireline access network	
areaCodeC	AreaCode	C	0..1	Area Code for 5G-CRG/FN-CRG is accessing via wireline access network	
combGciAndHfcNIds	array(CombGciAndHfcNIds)	C	1..N	List of combinations of GCI and HFC Node ID, for a 5G-CRG or an AUN3 device behind the 5G-CRG accessing the 5GC via wireline access network.	
NOTE: One and only one of the "globLineIds", "hfcNIds", "areaCodeB", "areaCodeC" and combGciAndHfcNIds attributes shall be included in a WirelineArea data structure.					

## 5.4.4.39 Type: WirelineServiceAreaRestriction

Table 5.4.4.39-1: Definition of type WirelineServiceAreaRestriction

Attribute name	Data type	P	Cardinality	Description
restrictionType	RestrictionType	C	0..1	string "ALLOWED_AREAS" or "NOT_ALLOWED_AREAS" (NOTE 1)
areas	array(WirelineArea)	C	0..N	A list of Areas. These areas are: - allowed areas if RestrictionType is "ALLOWED_AREAS" - not allowed areas if RestrictionType is "NOT_ALLOWED_AREAS" (NOTE 1) (NOTE 2)
NOTE 1: The "restrictionType" attribute and the "areas" attribute shall be either both present or absent.				
NOTE 2: The empty array is used when service is allowed/restricted nowhere.				

## 5.4.4.40 Type: ApnRateStatus

Table 5.4.4.40-1: Definition of type ApnRateStatus

Attribute name	Data type	P	Cardinality	Description
remainPacketsUI	integer	C	0..1	This IE shall be included if available. When present, it shall contain the number of packets the UE is allowed to send uplink in the given time unit for the given APN (all PDN connections of the UE to this APN see clause 4.7.7.3 in 3GPP TS 23.401 [33]).
remainPacketsDI	integer	C	0..1	This IE shall be included if available. When present, it shall contain the number of packets, which the UE is allowed to send downlink for the given time unit period of time and for the given APN (all PDN connections of the UE to this APN, see clause 4.7.7.3 in 3GPP TS 23.401 [33]).
validityTime	DateTime	C	0..1	This IE shall be included if available. When present, it shall indicate the period of time during which the APN rate control status will remain valid.
remainExReportsUI	integer	C	0..1	This IE shall be included if available. When present, it shall indicate the number of additional exception reports the UE is allowed to send uplink in the given time unit for the given APN (all PDN connections of the UE to this APN, see clause 4.7.7.3 in 3GPP TS 23.401 [33]).
remainExReportsDI	integer	C	0..1	This IE shall be included if available. When present, it shall indicate the number of additional exception reports the AF is allowed to send downlink in the given time unit for the given APN (all PDN connections of the UE to this APN, see clause 4.7.7.3 in 3GPP TS 23.401 [33]).

## 5.4.4.41 Type: ScheduledCommunicationTime

Table 5.4.4.41-1: Definition of type ScheduledCommunicationTime

Attribute name	Data type	P	Cardinality	Description
daysOfWeek	array(DayOfWeek)	O	1..6	Identifies the day(s) of the week. If absent, it indicates every day of the week.
timeOfDayStart	TimeOfDay	O	0..1	Identifies the start time of the day.
timeOfDayEnd	TimeOfDay	O	0..1	Identifies the end time of the day.

## 5.4.4.42 Type: ScheduledCommunicationTimeRm

This data type is defined in the same way as the "ScheduledCommunicationTime" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.43 Type: BatteryIndication

Table 5.4.4.43-1: Definition of type BatteryIndication

Attribute name	Data type	P	Cardinality	Description
batteryInd	boolean	O	0..1	When present, this IE shall indicate whether the UE is battery powered or not. true: the UE is battery powered; false or absent: the UE is not battery powered.
replaceableInd	boolean	O	0..1	When present, this IE shall indicate whether the battery of the UE is replaceable or not. true: the battery of the UE is replaceable; false or absent: the battery of the UE is not replaceable.
rechargeableInd	boolean	O	0..1	When present, this IE shall indicate whether the battery of the UE is rechargeable or not. true: the battery of UE is rechargeable; false or absent: the battery of the UE is not rechargeable.
NOTE:	Parameters "replaceableInd" and "rechargeableInd" are only included if the value of Parameter "batteryInd" is true.			

## 5.4.4.44 Type: BatteryIndicationRm

This data type is defined in the same way as the "BatteryIndication" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.45 Type: AcsInfo

Table 5.4.4.45-1: Definition of type AcsInfo

Attribute name	Data type	P	Cardinality	Description
acsUrl	Uri	O	0..1	This IE may contain the URL of the ACS, see BBF TR-069 [34] or BBF TR-369 [35]. (NOTE)
acslpv4Addr	Ipv4Addr	O	0..1	This IE may contain the IPv4 address of the ACS, see BBF TR-069 [34] or BBF TR-369 [35]. (NOTE)
acslpv6Addr	Ipv6Addr	O	0..1	This IE may contain the IPv6 address of the ACS, see BBF TR-069 [34] or BBF TR-369 [35]. (NOTE)
NOTE:	At least one of acsUrl, acslpv4Addr, acslpv6Addr shall be included.			

## 5.4.4.46 Type: AcsInfoRm

This data type is defined in the same way as the "AcsInfo" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.47 Type: NrV2xAuth

Table 5.4.4.47-1: Definition of type NrV2xAuth

Attribute name	Data type	P	Cardinality	Description
vehicleUeAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized as Vehicle UE.
pedestrianUeAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized as Pedestrian UE.

## 5.4.4.48 Type: LteV2xAuth

Table 5.4.4.48-1: Definition of type LteV2xAuth

Attribute name	Data type	P	Cardinality	Description
vehicleUeAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized as Vehicle UE.
pedestrianUeAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized as Pedestrian UE.

## 5.4.4.49 Type: Pc5QoSPara

Table 5.4.4.49-1: Definition of type Pc5QoSPara

Attribute name	Data type	P	Cardinality	Description
pc5QosFlowList	array(Pc5QosFlowItem)	M	1..N	This IE shall contain the set of PC5 flow(s).
pc5LinkAmbr	BitRate	C	0..1	This IE shall be present if available. When present, it shall represent the PC5 Link Aggregated Bit Rates for all the Non-GBR QoS Flows (see clause 5.4.2.3 of 3GPP TS 23.287 [36]).

## 5.4.4.50 Type: Pc5QosFlowItem

Table 5.4.4.50-1: Definition of type Pc5QosFlowItem

Attribute name	Data type	P	Cardinality	Description
pqi	5Qi	M	1	PQI is a special 5QI (see clause 5.4.2.1 of 3GPP TS 23.287 [36]).
pc5FlowBitRates	Pc5FlowBitRates	C	0..1	This IE shall be present if available. When present, it shall represent the PC5 Flow Bit Rates (see clause 5.4.2.2 of 3GPP TS 23.287 [36]).
range	UInteger	C	0..1	This IE shall be present if available. When present, it shall represent the Range in the unit of meters (see clause 5.4.2.4 of 3GPP TS 23.287 [36]).

## 5.4.4.51 Type: Pc5FlowBitRates

Table 5.4.4.51-1: Definition of type Pc5FlowBitRates

Attribute name	Data type	P	Cardinality	Description
guaFbr	BitRate	C	0..1	This IE shall be present if available. When present, it shall contain the guaranteed Bit Rate for the PC5 QoS flow.
maxFbr	BitRate	C	0..1	This IE shall be present if available. When present, it shall contain the maximum Bit Rate for the PC5 QoS flow.

## 5.4.4.52 Type: UltraLocation

Table 5.4.4.52-1: Definition of type UltraLocation

Attribute name	Data type	P	Cardinality	Description
cgi	CellGlobalId	O	0..1	Cell Global Identification. See 3GPP TS 23.003 [7], clause 4.3.1 (NOTE 1)
sai	ServiceAreaId	O	0..1	Service Area Identifier. See 3GPP TS 23.003 [7], clause 12.5 (NOTE 1)
lai	LocationAreaId	O	0..1	Location area identification. See 3GPP TS 23.003 [7], clause 4.1 (NOTE 1)
rai	RoutingAreaId	O	0..1	Routing Area Identification. See 3GPP TS 23.003 [7], clause 4.2
ageOfLocationInformation	integer	O	0..1	The value represents the elapsed time in minutes since the last network contact of the mobile station. Value "0" indicates that the location information was obtained after a successful paging procedure for Active Location Retrieval when the UE is in idle mode or after a successful location reporting procedure the UE is in connected mode. Any other value than "0" indicates that the location information is the last known one. See 3GPP TS 29.002 [21] clause 17.7.8.
ueLocationTimestamp	DateTime	O	0..1	The value represents the UTC time when the UeLocation information was acquired.
geographicalInformation	string	O	0..1	Refer to geographical Information. See 3GPP TS 23.032 [23] clause 7.3.2. Only the description of an ellipsoid point with uncertainty circle is allowed to be used. Allowed characters are 0-9 and A-F;
geodeticInformation	string	O	0..1	Refers to Calling Geodetic Location. See ITU-T Recommendation Q.763 (1999) [24] clause 3.88.2. Only the description of an ellipsoid point with uncertainty circle is allowed to be used. Allowed characters are 0-9 and A-F.

NOTE 1: Exactly one of cgi, sai or lai shall be present.

## 5.4.4.53 Type: GeraLocation

Table 5.4.4.53-1: Definition of type GeraLocation

Attribute name	Data type	P	Cardinality	Description
locationNumber	string	O	0..1	Location number within the PLMN. See 3GPP TS 23.003 [7], clause 4.5.
cgi	CellGlobalId	O	0..1	Cell Global Identification. See 3GPP TS 23.003 [7], clause 4.3.1 (NOTE 1)
sai	ServiceAreaId	O	0..1	Service Area Identifier. See 3GPP TS 23.003 [7], clause 12.5 (NOTE 1)
lai	LocationAreaId	O	0..1	Location Area identification. See 3GPP TS 23.003 [7], clause 4.1 (NOTE 1)
rai	RoutingAreaId	O	0..1	Routing Area Identification. See 3GPP TS 23.003 [7], clause 4.2
vlrNumber	string	O	0..1	VLR number. See 3GPP TS 23.003 [7] clause 5.1.
mscNumber	string	O	0..1	MSC number. See 3GPP TS 23.003 [7] clause 5.1.
ageOfLocationInformation	integer	O	0..1	The value represents the elapsed time in minutes since the last network contact of the mobile station. Value "0" indicates that the location information was obtained after a successful paging procedure for Active Location Retrieval when the UE is in idle mode or after a successful location reporting procedure the UE is in connected mode. Any other value than "0" indicates that the location information is the last known one. See 3GPP TS 29.002 [21] clause 17.7.8.
ueLocationTimestamp	DateTime	O	0..1	The value represents the UTC time when the UeLocation information was acquired.
geographicalInformation	string	O	0..1	Refer to geographical Information. See 3GPP TS 23.032 [23] clause 7.3.2. Only the description of an ellipsoid point with uncertainty circle is allowed to be used. Allowed characters are 0-9 and A-F;
geodeticInformation	string	O	0..1	Refers to Calling Geodetic Location. See ITU-T Recommendation Q.763 (1999) [24] clause 3.88.2. Only the description of an ellipsoid point with uncertainty circle is allowed to be used. Allowed characters are 0-9 and A-F.

NOTE 1: Exactly one of cgi, sai or lai shall be present.

## 5.4.4.54 Type: CellGlobalId

Table 5.4.4.54-1: Definition of type CellGlobalId

Attribute name	Data type	P	Cardinality	Description
plmnId	PlmnId	M	1	PLMN Identity
lac	string	M	1	Location Area Code Pattern: '^[A-Fa-f0-9]{4}\$'
cellId	string	M	1	Cell Identity Pattern: '^[A-Fa-f0-9]{4}\$'

## 5.4.4.55 Type: ServiceAreald

Table 5.4.4.55-1: Definition of type ServiceAreald

Attribute name	Data type	P	Cardinality	Description
plmnId	PlmnId	M	1	PLMN Identity
lac	string	M	1	Location Area Code Pattern: '[A-Fa-f0-9]{4}\$'
sac	string	M	1	Service Area Code Pattern: '[A-Fa-f0-9]{4}\$'

## 5.4.4.56 Type: LocationAreald

Table 5.4.4.56-1: Definition of type LocationAreald

Attribute name	Data type	P	Cardinality	Description
plmnId	PlmnId	M	1	PLMN Identity
lac	string	M	1	Location Area Code Pattern: '[A-Fa-f0-9]{4}\$'

## 5.4.4.57 Type: RoutingAreald

Table 5.4.4.57-1: Definition of type RoutingAreald

Attribute name	Data type	P	Cardinality	Description
plmnId	PlmnId	M	1	PLMN Identity
lac	string	M	1	Location Area Code Pattern: '[A-Fa-f0-9]{4}\$'
rac	string	M	1	Routing Area Code Pattern: '[A-Fa-f0-9]{2}\$'

## 5.4.4.58 Type: DddTrafficDescriptor

Table 5.4.4.58-1: Definition of type DddTrafficDescriptor

Attribute name	Data type	P	Cardinality	Description
ipv4Addr	Ipv4Addr	C	0..1	Ipv4 address of the source of downlink data.
ipv6Addr	Ipv6Addr	C	0..1	Ipv6 address of the source of downlink data.
portNumber	UInteger	O	0..1	Port number of the source of downlink data.
macAddr	MacAddr48	C	0..1	Source MAC address.
NOTE:	Either IP address (at least one of the "ipv4Addr" attribute or the "ipv6Addr" attribute) or MAC address (the "macAddr" attribute) shall be included.			

## 5.4.4.59 Type: MoExpDataCounter

Table 5.4.4.59-1: Definition of type MoExpDataCounter

Attribute name	Data type	P	Cardinality	Description
counter	integer	M	1	Unsigned integer identifying the MO Exception Data Counter, as specified in clause 5.31.14.3 of 3GPP TS 23.501 [8].
timeStamp	DateTime	O	0..1	UTC time indicating the time at which the counter value increased from 0 to 1.

## 5.4.4.60 Type: NssaaStatus

Table 5.4.4.60-1: Definition of type NssaaStatus

Attribute name	Data type	P	Cardinality	Description
snssai	Snssai	M	1	Subscribed S-NSSAI
status	AuthStatus	M	1	This flag when present shall indicate the NSSAA status of the related Snssai.

## 5.4.4.61 Type: NssaaStatusRm

This data type is defined in the same way as the "NssaaStatus" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.62 Type: TnapId

Table 5.4.4.62-1: Definition of type TnapId

Attribute name	Data type	P	Cardinality	Description
ssid	string	C	0..1	This IE shall be present if the UE is accessing the 5GC via a trusted WLAN access network. When present, it shall contain the SSID of the access point to which the UE is attached, that is received over NGAP, see IEEE Std 802.11-2012 [31].
bssid	string	C	0..1	This IE shall be present if available and if the UE is accessing the 5GC via a trusted WLAN access network. When present, it shall contain the BSSID of the access point to which the UE is attached, that is received over NGAP, see IEEE Std 802.11-2012 [31].
civicAddress	Bytes	C	0..1	This IE shall be present if available and if the UE is accessing the 5GC via a trusted WLAN access network. This IE shall also be present if the UE behind the 5G-RG is accessing the 5GC via a trusted WLAN access network. When present, it shall contain the civic address information of the TNAP/5G-RG to which the UE is attached, including the Location-Information Attribute and / or Location-Data Attribute as defined in IETF RFC 5580 [40].

## 5.4.4.63 Type: TnapIdRm

This data type is defined in the same way as the "TnapId" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.64 Type: TwapId

Table 5.4.4.64-1: Definition of type TwapId

Attribute name	Data type	P	Cardinality	Description
ssid	string	M	1	This IE shall contain the SSID of the access point to which the UE is attached, that is received over NGAP, see IEEE Std 802.11-2012 [31].
bssid	string	C	0..1	This IE shall be present if available. When present, it shall contain the BSSID of the access point to which the UE is attached, for trusted WLAN access, see IEEE Std 802.11-2012 [31].
civicAddress	Bytes	C	0..1	This IE shall be present if available. When present, it shall contain the civic address information of the TWAP to which the UE is attached, for trusted WLAN access. This IE shall include the Location-Information Attribute and / or Location-Data Attribute as defined in IETF RFC 5580 [40].

## 5.4.4.65 Type: TwapIdRm

This data type is defined in the same way as the "TwapId" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.66 Type: SnssaiExtension

Table 5.4.4.66-1: Definition of type SnssaiExtension

Attribute name	Data type	P	Cardinality	Description
sdRanges	array(SdRange)	C	1..N	When present, it shall contain the range(s) of Slice Differentiator values supported for the Slice/Service Type value indicated in the sst attribute of the Snssai data type (see clause 5.4.4.2).
wildcardSd	boolean	C	0..1	When present, it shall be set to true, to indicate that all SD values are supported for the Slice/Service Type value indicated in the sst attribute of the Snssai data type (see clause 5.4.4.2).
NOTE 1: sdRanges and wildcardSd shall not be present simultaneously.				
NOTE 2: An SdRange may include the value "FFFFFF"; similarly, if wildcardSd is set to true, the SD value "FFFFFF" is one of the supported values. In both cases the SST without associated SD is one of the supported SNSSAIs, as the value "FFFFFF" indicates "no SD value associated with the SST" (see 3GPP TS 23.003 [7]).				

## 5.4.4.67 Type: SdRange

Table 5.4.4.67-1: Definition of type SdRange

Attribute name	Data type	P	Cardinality	Description
start	string	M	1	First value identifying the start of an SD range.  This string shall be formatted as specified for the sd attribute of the Snssai data type in clause 5.4.4.2.
end	string	M	1	Last value identifying the end of an SD range.  This string shall be formatted as specified for the sd attribute of the Snssai data type in clause 5.4.4.2.

EXAMPLE: SD range from 023400 to 023499 (hexadecimal)  
JSON: { "start": "023400", "end": "023499" }

5.4.4.68 Type: ProseServiceAuth

**Table 5.4.4.68-1: Definition of type ProseServiceAuth**

Attribute name	Data type	P	Cardinality	Description
proseDirectDiscoveryAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to use ProSe Direct Discovery.
proseDirectCommunicationAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to use ProSe Direct Communication.
proseL2RelayAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-2 UE-to-Network Relay.
proseL3RelayAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-3 UE-to-Network Relay.
proseL2RemoteAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-2 Remote UE.
proseL3RemoteAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-3 Remote UE.
proseMultipathComL2RemoteAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to use multi-path communication via direct Uu path and via 5G ProSe Layer-2 UE-to-Network Relay as a 5G ProSe Layer-2 Remote UE.
proseL2UeRelayAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-2 UE-to-UE Relay.
proseL3UeRelayAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-3 UE-to-UE Relay.
proseL2EndAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-2 End UE.
proseL3EndAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-3 End UE.
proseL3IntermediateRelayAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-3 Intermediate UE-to-Network Relay.
proseL3RemoteMulti-hopAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-3 Remote UE supporting Multi-hop 5G ProSe Layer-3 UE-to-Network Relay.
proseL3RelayMulti-hopAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-3 UE-to-Network Relay supporting Multi-hop 5G ProSe Layer-3 UE-to-Network Relay.
proseL3UeRelayMulti-hopAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-3 UE-to-UE Relay supporting Multi-hop 5G ProSe Layer-3 UE-to-UE Relay.
proseL3EndMulti-hopAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-3 End UE supporting Multi-hop 5G ProSe Layer-3 UE-to-UE Relay.
proseL2IntermediateRelayAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-2 Intermediate UE-to-Network Relay.
proseL2RemoteMulti-hopAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-2 Remote UE supporting Multi-hop 5G ProSe Layer-2 UE-to-Network Relay.
proseL2RelayMulti-hopAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as 5G ProSe Layer-2 UE-to-Network Relay supporting Multi-hop 5G ProSe Layer-2 UE-to-Network Relay.

## 5.4.4.69 Type: EcsServerAddr

Table 5.4.4.69-1: Definition of type EcsServerAddr

Attribute name	Data type	P	Cardinality	Description
ecsFqdnList	array(Fqdn)	C	1..N	This IE shall be included if available. When present, it shall contain the list of FQDN(s) of Edge Configuration Server(s).
ecsIpAddressList	array(IpAddr)	C	1..N	This IE shall be included if available. When present, it shall contain the list of IP Address(es) of Edge Configuration Server(s).
ecsUriList	array(Uri)	C	1..N	This IE shall be included if available. When present, it shall contain the list of URI(s) of the Edge Configuration Server(s).
ecsProviderId	string	C	0..1	This IE shall be included if available. When present, it shall contain the identifier of the Edge Configuration Server Provider.

## 5.4.4.70 Type: EcsServerAddrRm

This data type is defined in the same way as the "EcsServerAddr" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.71 Type: IpAddr

Table 5.4.4.71-1: Definition of type IpAddr

Attribute name	Data type	P	Cardinality	Description
ipv4Addr	Ipv4Addr	C	0..1	When present, it shall contain the IPv4 address.
ipv6Addr	Ipv6Addr	C	0..1	When present, it shall contain the IPv6 address.
ipv6Prefix	Ipv6Prefix	C	0..1	When present, it shall contain the IPv6 Prefix.

NOTE: Either ipv4Addr, or ipv6Addr, or ipv6Prefix shall be present.

5.4.4.72 Type: SACInfo

**Table 5.4.4.72-1: Definition of type SACInfo**

Attribute name	Data type	P	Cardinality	Description
numericValNumUes	integer	C	0..1	<p>This attribute may be present in the following cases:</p> <ul style="list-style-type: none"> <li>- to configure the monitoring threshold for the reporting of the number of registered UEs for a network slice identified by an S-NSSAI;</li> <li>- to report the network slice status for the current number of registered UEs.</li> </ul> <p>When used to configure the monitoring threshold for an S-NSSAI, it shall contain the configured event monitoring threshold value for monitoring the number of registered UEs expressed in a numerical value.</p> <p>When used to report the network slice status for an S-NSSAI, it shall contain the current number of registered UEs in the concerned network slice expressed in a numerical value.</p> <p>For threshold based reporting and the threshold value for the number of registered UEs in the concerned network slice was previously configured in the form of a numerical value, this attribute shall contain the current number of registered UEs in the concerned network slice expressed in a numerical value.</p>
numericValNumPduSess	integer	C	0..1	<p>This attribute may be present in the following cases:</p> <ul style="list-style-type: none"> <li>- to configure the monitoring threshold for the reporting of the number established PDU session for a network slice identified by an S-NSSAI;</li> <li>- to report the network slice status for the number of established PDU sessions.</li> </ul> <p>When used to configure the monitoring threshold for an S-NSSAI, it shall contain the configured event monitoring threshold value for monitoring the number of established PDU sessions expressed in a numerical value.</p> <p>When used to report the network slice status for an S-NSSAI, it shall contain the current number of established PDU sessions in the concerned network slice expressed in a numerical value.</p> <p>For threshold based reporting and the threshold value for the number of established PDU sessions in the concerned network slice was previously configured in the form of a numerical value, this attribute shall contain the current number of established PDU sessions in the concerned network slice expressed in a numerical value.</p>

percValueNumUes	integer	C	0..1	<p>This attribute may be present in the following cases:</p> <ul style="list-style-type: none"> <li>- to configure the monitoring threshold for the reporting of the number of registered UEs for a network slice identified by an S-NSSAI;</li> <li>- to report the network slice status for the number of registered UEs .</li> </ul> <p>When used to configure the monitoring threshold for an S-NSSAI, it shall contain an unsigned integer indicating the event monitoring threshold value for the number of registered UEs expressed in percentage format.</p> <p>When used to report the network slice status for an S-NSSAI, it shall contain the current number of registered UEs in the concerned network slice expressed as a percentage. For threshold based reporting and the threshold value for the number of registered UEs in the concerned network slice was previously configured as a percentage, this attribute shall contain the current number of registered UEs in the concerned network slice expressed as a percentage.</p> <p>Minimum = 0. Maximum = 100.</p>
percValueNumPduSessions	integer	C	0..1	<p>This IE may be present in the following cases:</p> <ul style="list-style-type: none"> <li>- to configure the monitoring threshold for the reporting of the number of established PDU sessions for a network slice identified by an S-NSSAI;</li> <li>- to report the network slice status for the number of established PDU sessions.</li> </ul> <p>When used to configure the monitoring threshold for an S-NSSAI, it shall contain an unsigned integer indicating the event monitoring threshold value for the number of established PDU sessions expressed in percentage format.</p> <p>When used to report the status of an S-NSSAI, it shall contain the current number of established PDU sessions in the concerned network slice expressed as a percentage. For threshold based reporting and the threshold value for the number of established PDU sessions in the concerned network slice was previously configured as a percentage, this attribute shall contain the current number of established PDU sessions in the concerned network slice expressed as a percentage.</p> <p>Minimum = 0. Maximum = 100.</p>
uesWithPduSessionInd	boolean	C	0..1	<p>This IE may be present if the numericValNumUes IE or the percValueNumUes IE is present, when reporting the network slice status for an S-NSSAI.</p> <p>When present, it shall be set as follows:</p> <ul style="list-style-type: none"> <li>- True: the numericValNumUes and percValueNumUes report the number of UEs with at least one PDU session/PDN connection.</li> <li>- False (default): the numericValNumUes and percValueNumUes report the current number of registered UEs.</li> </ul>

## 5.4.4.73 Type: SACEventStatus

Table 5.4.4.73-1: Definition of type SACEventStatus

Attribute name	Data type	P	Cardinality	Description
reachedNumUes	SACInfo	O	0..1	Contains a confirmation that the requested threshold for the number of registered UEs in the concerned network slice was reached, when threshold based reporting is used, or the current number of registered UEs in the concerned network slice, when periodic reporting / immediate reporting is used.
reachedNumPduSessions	SACInfo	O	0..1	Contains a confirmation that the requested threshold for the number of established PDU session in the concerned network slice was reached, when threshold based reporting is used, or the current number of established PDU sessions in the concerned network slice, when periodic reporting / immediate reporting is used.

## 5.4.4.74 Type: SpatialValidityCond

Table 5.4.4.74-1: Definition of type SpatialValidityCond

Attribute name	Data type	P	Cardinality	Description
trackingAreaList	array(Tai)	C	1..N	This IE shall be included if available. When present, it shall contain the list of tracking areas identities.
countries	array(Mcc)	O	1..N	When present, it shall contain the list of Mobile Country Codes.
geographicalServiceArea	GeoServiceArea	O	0..1	Geographical Service Area; see 3GPP TS 23.558 [49] clause 7.3.3.3

## 5.4.4.75 Type: SpatialValidityCondRm

This data type is defined in the same way as the "SpatialValidityCond" data type, but with the OpenAPI "nullable: true" property.

## 5.4.4.76 Type: ServerAddressingInfo

Table 5.4.4.76 -1: Definition of type ServerAddressingInfo

Attribute name	Data type	P	Cardinality	Description
ipv4Addresses	array(Ipv4Addr)	C	1..N	IPv4 address(es) of the server (NOTE).
ipv6Addresses	array(Ipv6Addr)	C	1..N	IPv6 address(es) of the server (NOTE).
fqdnList	array(Fqdn)	C	1..N	List of FQDNs (Fully Qualified Domain Names) of the server (NOTE).
NOTE: At least one of the addressing parameters (ipv4addresses, ipv6addresses or fqdnList) shall be included in the ServerAddressingInfo; all addressing parameters in this data type shall be understood as referring to a same sever.				

## 5.4.4.77 Type PcfUeCallbackInfo

Table 5.4.4.77-1: Definition of type PcfUeCallbackInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
callbackUri	Uri	M	1	This IE shall contain the Callback URI on the PCF for a UE to receive the SM Policy Association Establishment and Termination Event Notifications from the PCF for a PDU session.	
bindingInfo	string	O	0..1	This IE shall be present, if available.  When present, this IE shall contain the Binding indications of the Callback URI on the PCF for a UE indicated by callbackUri IE and set to the value of the 3gpp-Sbi-Binding header defined in clause 5.2.3.2.6 of 3GPP TS 29.500 [25], without the header name.	

## 5.4.4.78 Type PduSessionInfo

Table 5.4.4.78-1: Definition of type PduSessionInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
snssai	Snssai	M	1	This IE shall indicate the S-NSSAI in the serving PLMN of a PDU session.	
dnn	Dnn	M	1	This IE shall Indicate the DNN of a PDU session.  If DNN replacement is applicable for the PDU session, this IE shall indicate the DNN of the PDU session after DNN replacement.	

## 5.4.4.79 Type EasIpReplacementInfo

Table 5.4.4.79-1: Definition of type EasIpReplacementInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
source	EasServerAddress	M	1	Address of the source EAS, i.e., address that shall be used for the traffic on the N3 side of the UPF(s).	
target	EasServerAddress	M	1	Address of the target EAS, i.e., address that shall be used for the traffic on the N6 side of the UPF(s).	

## 5.4.4.80 Type EasServerAddress

Table 5.4.4.80-1: Definition of type EasServerAddress

Attribute name	Data type	P	Cardinality	Description	Applicability
ip	IpAddr	M	1	IP address information.	
port	UInteger	M	1	IP port number.	

## 5.4.4.81 Type RoamingRestrictions

Table 5.4.4.81-1: Definition of type RoamingRestrictions

Attribute name	Data type	P	Cardinality	Description	Applicability
accessAllowed	boolean	C	0..1	Indicates if access is allowed to a given serving network, e.g. a PLMN (MCC, MNC) or an SNPN (MCC, MNC, NID). NOTE	
NOTE: The actual query determines if the 'accessAllowed' attribute refers to an SNPN or to a PLMN.					

## 5.4.4.82 Type: GeoServiceArea

Table 5.4.4.82-1: Definition of type GeoServiceArea

Attribute name	Data type	P	Cardinality	Description
geographicAreaList	array(Geographic Area)	O	1..N	Identifies a list of geographic area specified by different shapes.
civicAddressList	array(CivicAddresses)	O	1..N	Identifies a list of civic address.

## 5.4.4.83 Type: MutingExceptionInstructions

Table 5.4.4.83-1: Definition of type MutingExceptionInstructions

Attribute name	Data type	P	Cardinality	Description
bufferedNotifs	BufferedNotificationsAction	O	0..1	When present, it shall indicate the action required by the NF Service Consumer to the NF Service Producer on the buffered notifications if an exception occurs while the event is muted.
subscription	SubscriptionAction	O	0..1	When present, it shall indicate the action required by the NF Service Consumer to the NF Service Producer on the subscription if an exception occurs while the event is muted.

## 5.4.4.84 Type: MutingNotificationsSettings

Table 5.4.4.84-1: Definition of type MutingNotificationsSettings

Attribute name	Data type	P	Cardinality	Description
maxNoOfNotif	integer	O	0..1	Maximum number of notifications that can be stored by the Event producer NF.
durationBufferedNotif	DurationSec	O	0..1	Maximum duration during which notifications can be buffered by the Event producer NF.

## 5.4.4.85 Type: VplmnOffloadingInfo

Table 5.4.4.85-1: Definition of type VplmnOffloadingInfo

Attribute name	Data type	P	Cardinality	Description
offloadIdentifier	OffloadIdentifier	O	0..1	Offload Identifier uniquely identifying the VPLMN Offloading information provided by the HPLMN.
vplmnId	PlmnId	O	0..1	V-PLMN ID. When absent, the PLMN ID of the PLMN serving the UE shall be assumed.
allowedTraffic	boolean	O	0..1	When present, this IE shall be set as follows: - true (default): the VplmnOffloadingInfo describes the traffic allowed to be offloaded - false: the VplmnOffloadingInfo describes the traffic disallowed to be offloaded
ipv4AddressRanges	array(Ipv4AddressRange)	O	1..N	List of ranges of IPv4 addresses allowed (or disallowed) to be routed to the local part of DN in the VPLMN
ipv4AddrMasks	array(Ipv4AddrMask)	O	1..N	List of ranges of IPv4 addresses allowed (or disallowed) to be routed to the local part of DN in the VPLMN, whereby each range of IPv4 addresses corresponds to the IPv4 addresses of an IPv4 subnet defined by an IPv4 address and subnet mask.
ipv6AddressRanges	array(Ipv6AddressRange)	O	1..N	List of ranges of IPv6 addresses allowed (or disallowed) to be routed to the local part of DN in the VPLMN
ipv6PrefixRanges	array(Ipv6PrefixRange)	O	1..N	List of ranges of IPv6 prefixes allowed (or disallowed) to be routed to the local part of DN in the VPLMN
fqdnList	array(Fqdn)	O	1..N	List of FQDNs allowed (or disallowed) to be routed to the local part of DN in the VPLMN
fqdnPatterns	array(FqdnPatternMatchingRule)	O	1..N	List of FQDN patterns of FQDNs allowed (or disallowed) to be routed to the local part of DN in the VPLMN
NOTE:	If none of the ipv4AddressRanges, ipv4AddrMasks, ipv6AddressRanges, ipv6PrefixRanges, fqdnList and fqdnPatterns IEs is present, all the traffic of the PDU session is allowed to be routed to the local part of DN in the VPLMN. At least one of these IEs shall be present when the allowedTraffic IE is set to false.			

## 5.4.4.86 Type: PartiallyAllowedSnsai

Table 5.4.4.86-1: Definition of type PartiallyAllowedSnsai

Attribute name	Data type	P	Cardinality	Description
snsai	Snsai	M	1	This IE shall indicate the S-NSSAI that is partially allowed in the Registration Area.
allowedTailList	array(Tai)	M	1..N	This IE shall contain the list of TAI(s) in the Registration Area where the indicated S-NSSAI is allowed.

## 5.4.4.87 Type: VarRepPeriod

Table 5.4.4.87-1: Definition of type VarRepPeriod

Attribute name	Data type	P	Cardinality	Description
repPeriod	DurationSec	M	1	This IE describes the period time for the variable event reports.
percValueNfLoad	UInteger	C	0..1	This IE shall be present if the variable reporting periodicity is based on the load of NF service producer (see 3GPP TS 23.502 [28], clause 4.15.1). When present, this IE indicates the load percentage of NF service producer, within the range 0 to 100.
NOTE: The reporting periodicity is changed depending on the load of NF service producer, if the load of NF service producer is equal or greater than several values in array of VarRepPeriod, the repPeriod related to the highest value of nfLoad shall be applied.				

## 5.4.4.88 Type: RangingSIPosAuth

Table 5.4.4.88-1: Definition of type RangingSIPosAuth

Attribute name	Data type	P	Cardinality	Description
rgSIPosPc5Auth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to perform Ranging/Sidelink Positioning over PC5.
rgSIPosLocAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as Located UE.
rgSIPosClientAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as SL Positioning Client UE.
rgSIPosServerAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized to act as SL Positioning Server UE.

## 5.4.4.89 Type: NrA2xAuth

Table 5.4.4.89-1: Definition of type NrA2xAuth

Attribute name	Data type	P	Cardinality	Description
uavUeAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized as UAV UE.

## 5.4.4.90 Type: LteA2xAuth

Table 5.4.4.90-1: Definition of type LteA2xAuth

Attribute name	Data type	P	Cardinality	Description
uavUeAuth	UeAuth	C	0..1	This IE shall be present if available. When present, it shall indicate whether the UE is authorized as UAV UE.

## 5.4.4.91 Type: SliceUsageControlInfo

Table 5.4.4.91-1: Definition of type SliceUsageControlInfo

Attribute name	Data type	P	Cardinality	Description
sNssai	Snssai	M	1	S-NSSAI
dereglInactTimer	DurationSec	C	0..1	Identifies the slice deregistration inactivity timer for the Network Slice identified by the sNssai IE (see 3GPP TS 23.501 [8], clause 5.15.15.3)  The value shall be applied to both 3GPP access and Non-3GPP access.  (NOTE)
sessInactTimer	DurationSec	C	0..1	Identifies the PDU Session inactivity timer for the Network Slice identified by the sNssai IE (see 3GPP TS 23.501 [8], clause 5.15.15.3)  The value shall be applied to both 3GPP access and Non-3GPP access.  (NOTE)
NOTE: At least dereglInactTimer or sessInactTimer shall be present.				

## 5.4.4.92 Type: CombGciAndHfcNIds

Table 5.4.4.92-1: Definition of type CombGciAndHfcNIds

Attribute name	Data type	P	Cardinality	Description	Applicability
globalCableId	Gci	C	0..1	Global Cable Identifier, for an AUN3 device behind 5G-CRG accessing the 5GC via wireline access network.	
hfcNid	HfcNid	C	0..1	HFC Node Id, for an AUN3 device behind 5G-CRG is accessing the 5GC via wireline access network.	

## 5.4.4.93 Type: SnssaiDnnItem

Table 5.4.4.93-1: Definition of type SnssaiDnnItem

Attribute name	Data type	P	Cardinality	Description
snssaiList	array(ExtSnssai)	C	1..N	List of S-NSSAIs
dnnList	array(Dnn)	C	1..N	List of DNNs
NOTE: At least one of the snssaiList and dnnList IEs shall be present. If the dnnList IE is absent, this indicates that all DNNs of the provided S-NSSAIs are considered. If the snssaiList IE is absent, this indicates that all S-NSSAIs of the provided DNNs are considered. If both IEs are present, this indicates that the provided DNNs for the provided S-NSSAIs are considered.				

## 5.4.4.94 Type: NtnTailInfo

Table 5.4.4.94-1: Definition of type NtnTailInfo

Attribute name	Data type	P	Cardinality	Description
plmnId	PlmnIdNid	M	1	UE's serving PLMN Identity
taclist	array(Tac)	M	1..N	TAC list received from satellite NG-RAN without the forbidden TACs for the UE
derivedTac	Tac	O	0..1	This attribute may be present if Derived TAC is received from satellite NG-RAN

## 5.4.4.95 Type: MitigationInfo

Table 5.4.4.95-1: Definition of type MitigationInfo

Attribute name	Data type	P	Cardinality	Description
percValueNumUes	integer	C	0..1	This IE shall be present if available.  When present, it shall contain an unsigned integer indicating the number of registered UEs expressed in percentage format applied for Network Slice Replacement.  Minimum = 0. Maximum = 100.
newUesInd	boolean	C	0..1	This IE shall be present if available. When present, it shall be set to true to indicate the Network Slice Replacement is applied for new UEs.
NOTE: Either the percValueNumUes IE or the newUesInd IE shall be present.				

## 5.4.4.96 Type: VplmnDIAmbr

Table 5.4.4.96-1: VplmnDIAmbr

Attribute name	Data type	P	Cardinality	Description
vplmnId	PlmnId	M	1	V-PLMN ID.
sessionDIAmbr	BitRate	M	1	Authorized DL Session AMBR for Offloading, i.e. DL Aggregate Maximum Bit Rate for the Non-GBR QoS Flows of the PDU Session authorized for offloading to the local part of DN in VPLMN.

## 5.4.4.97 Type: LocalOffloadingManagementInfo

Table 5.4.4.97-1: Definition of type LocalOffloadingManagementInfo

Attribute name	Data type	P	Cardinality	Description
offloadIdentifier	OffloadIdentifier	C	0..1	When present, this IE shall uniquely identify the Local Offloading Management information within a PLMN. (NOTE 1) (NOTE 2)
allowedTraffic	boolean	O	0..1	When present, this IE shall be set as follows: - true (default): the LocalOffloadingInfo describes the traffic allowed to be offloaded - false: the LocalOffloadingInfo describes the traffic disallowed to be offloaded
ipv4AddressRanges	array(Ipv4AddressRange)	C	1..N	List of ranges of IPv4 addresses allowed (or disallowed) to be routed to the local part of DN. (NOTE 2)
ipv4AddrMasks	array(Ipv4AddrMask)	C	1..N	List of ranges of IPv4 addresses allowed (or disallowed) to be routed to the local part of DN, whereby each range of IPv4 addresses corresponds to the IPv4 addresses of an IPv4 subnet defined by an IPv4 address and subnet mask. (NOTE 2)
ipv6AddressRanges	array(Ipv6AddressRange)	C	1..N	List of ranges of IPv6 addresses allowed (or disallowed) to be routed to the local part of DN. (NOTE 2)
ipv6PrefixRanges	array(Ipv6PrefixRange)	C	1..N	List of ranges of IPv6 prefixes allowed (or disallowed) to be routed to the local part of DN. (NOTE 2)
fqdnList	array(Fqdn)	C	1..N	List of FQDNs allowed (or disallowed) to be routed to the local part of DN. (NOTE 2)
fqdnPatterns	array(FqdnPatternMatchingRule)	C	1..N	List of FQDN patterns of FQDNs allowed (or disallowed) to be routed to the local part of DN. (NOTE 2)
NOTE 1: If none of the ipv4AddressRanges, ipv4AddrMasks, ipv6AddressRanges, ipv6PrefixRanges, fqdnList and fqdnPatterns IEs is present, whether the traffic of the PDU session is allowed to be routed to the local part of DN is determined based on the stored or pre-configured Local Offloading Management Policy identified by offload identifier.				
NOTE 2: At least one of the "offloadIdentifier", "ipv4AddressRanges", "ipv4AddrMasks", "ipv6AddressRanges", "ipv6PrefixRanges", "fqdnList" and "fqdnPatterns" attributes shall be included.				

## 5.4.4.98 Type: CagProvisionInformation

Table 5.4.4.98-1: Definition of type CagProvisionInformation

Attribute name	Data type	P	Cardinality	Description
cagInfo	array(CagId)	M	1..N	Indicates a list of CAG ID(s) identifying the CAG(s) which are allowed for a UE or for a list of UEs.
commonValidTimePeriodList	array(ValidTimePeriod)	C	0..N	This IE shall be present in the following cases: - the provisionOperation attribute is not present; or - the provisionOperation attribute is present with the value of "ADD" or "REPLACE".  When present, it indicates the time periods during which the UE can access CAG cells.  The time periods present in this IE shall be applied to all CAG ID(s) listed in the cagInfo attribute.  An empty array indicates no common time periods are configured to those CAG ID(s).
additionalValidTimePeriodList	map(array(ValidTimePeriod))	O	1..M(1..N)	A map (list of key-value pairs) where CAG ID converted to string serves as key, and the value is an array of time periods associated with the CAG ID.  This IE may be present if some CAG ID(s) are configured with additional time periods that are different from the time periods in the commonValidTimePeriodList attribute.
provisionOperation	CagProvisionOperation	O	0..1	Indicates the CAG provision operation applied to the CAG ID list present in the cagInfo attribute. If this attribute is not present, it indicates the CAG ID list indicated in the cagInfo attribute is used to replace the previously configured CAG ID list, if any.
NOTE:	If a CAG ID is not associated to any validity time period(s) (i.e. neither the commonValidTimePeriodList is present with non-empty time periods nor the corresponding CAG ID is present in the additionalValidTimePeriodList attribute), the CAG shall be permanently allowed.			

## 5.4.5 Data types describing alternative data types or combinations of data types

## 5.4.5.1 Type: ExtSnssai

Table 5.4.5.1-1: Definition of type ExtSnssai as a list of to be combined data types

Data type	Cardinality	Description
Snssai	1	Common data type defined in clause 5.4.4.2.
SnssaiExtension	1	Extensions to the Snssai common data type defined in clause 5.4.4.66.
NOTE:	The sdRanges and wildcardSd attributes shall be exclusive from each other. If one of these attributes is present, the sd attribute shall also be present and it shall contain one Slice Differentiator value within the range of SD (if the sdRanges attribute is present) or with any value (if the wildcardSd attribute is present).	

## 5.4.5.2 Type: SnssaiReplacelInfo

Table 5.4.5.2-1: Definition of type SnssaiReplacelInfo

Attribute name	Data type	P	Cardinality	Description
snssai	Snssai	M	1	Indicates the impacted S-NSSAI.
status	SnssaiStatus	C	0..1	It shall be present, if the status of the S-NSSAI indicated in the snssai IE changes. When present, it indicates the availability status of the S-NSSAI indicated in the snssai IE.
altSnssai	Snssai	C	0..1	It shall be present, if the alternative S-NSSAI is requested to replace the S-NSSAI indicated in snssai IE. When present, this IE shall indicate the alternative S-NSSAI NSSAI to the impacted S-NSSAI indicated by the "snssai" attribute.  In the case of roaming it shall indicate: <ul style="list-style-type: none"> <li>- the alternative VPLMN S-NSSAI for replacement of the impacted VPLMN S-NSSAI, when the snssai IE contains a VPLMN S-NSSAI; or</li> <li>- the alternative HPLMN S-NSSAI for replacement of the impacted HPLMN S-NSSAI, when the snssai IE contains an HPLMN S-NSSAI.</li> </ul>
nsReplTerminInd	TerminationIndication	C	0..1	This IE shall be present for a notification of termination of Network Slice Replacement.
plmnId	PlmnId	C	0..1	This IE shall be present in roaming scenarios, if the impacted S-NSSAI indicated by the snssai IE is an HPLMN S-NSSAI. It may be present otherwise. When present, it shall indicate the PLMN ID of the impacted S-NSSAI (and alternative S-NSSAI).
mitigationInfo	MitigationInfo	O	0..1	This IE may be present for a notification of Network Slice Replacement. When present, it shall include the congestion mitigation information (see clause 5.2.16.3.3 of 3GPP TS 23.502 [28]).  If absent, Network Slice Replacement shall be applied for all the registered UEs and new UEs.

## 5.5 Data Types related to 5G QoS

## 5.5.1 Introduction

This clause defines common data types related to 5G QoS.

## 5.5.2 Simple Data Types

This clause specifies common simple data types.

**Table 5.5.2-1: Simple Data Types**

Type Name	Type Definition	Description
Qfi	integer	Unsigned integer identifying a QoS flow, within the range 0 to 63.
QfiRm	integer	This data type is defined in the same way as the "Qfi" data type, but with the OpenAPI "nullable: true" property.
5Qi	integer	Unsigned integer representing a 5G QoS Identifier (see clause 5.7.2.1 of 3GPP TS 23.501 [8]), within the range 0 to 255.
5QiRm	integer	This data type is defined in the same way as the "5Qi" data type, but with the OpenAPI "nullable: true" property.
BitRate	string	String representing a bit rate that shall be formatted as follows:  Pattern: <code>^\d+(\.\d+)? (bps Kbps Mbps Gbps Tbps)\$</code>  (NOTE)  Examples: "125 Mbps", "0.125 Gbps", "125000 Kbps"
BitRateRm	string	This data type is defined in the same way as the "BitRate" data type, but with the OpenAPI "nullable: true" property.
PacketRate	string	String representing a packet rate, i.e. packets per second, that shall be formatted as follows:  Pattern: <code>^\d+(\.\d+)? (pps kpps Mpps Gpps Tpps)\$</code>  (NOTE)  Examples: "125 Mpps", "0.125 Gpps", "125000 kpps"
PacketRateRm	string	This data type is defined in the same way as the "PacketRate" data type, but with the OpenAPI "nullable: true" property.
TrafficVolume	string	String representing a traffic volume measured in bytes that shall be formatted as follows:  Pattern: <code>^\d+(\.\d+)? (B kB MB GB TB)\$</code>  (NOTE)  Examples: "125 MB", "0.125 GB", "125000 kB"
TrafficVolumeRm	string	This data type is defined in the same way as the "TrafficVolume" data type, but with the OpenAPI "nullable: true" property.
ArpPriorityLevel	integer	Unsigned integer indicating the ARP Priority Level (see clause 5.7.2.2 of 3GPP TS 23.501 [8]), within the range 1 to 15. Values are ordered in decreasing order of priority, i.e. with 1 as the highest priority and 15 as the lowest priority.
ArpPriorityLevelRm	integer	This data type is defined in the same way as the "ArpPriorityLevel" data type, but with the OpenAPI "nullable: true" property.
5QiPriorityLevel	integer	Unsigned integer indicating the 5QI Priority Level (see clauses 5.7.3.3 and 5.7.4 of 3GPP TS 23.501 [8]), within the range 1 to 127. Values are ordered in decreasing order of priority, i.e. with 1 as the highest priority and 127 as the lowest priority.
5QiPriorityLevelRm	integer	This data type is defined in the same way as the "5QiPriorityLevel" data type, but with the OpenAPI "nullable: true" property.
PacketDelBudget	integer	Unsigned integer indicating Packet Delay Budget (see clauses 5.7.3.4 and 5.7.4 of 3GPP TS 23.501 [8]), expressed in milliseconds. Minimum = 1.
PacketDelBudgetRm	integer	This data type is defined in the same way as the "PacketDelBudget" data type, but with the OpenAPI "nullable: true" property.

PacketErrRate	string	String representing Packet Error Rate (see clause 5.7.3.5 and 5.7.4 of 3GPP TS 23.501 [8]), expressed as a " <i>scalar</i> x 10- <i>k</i> " where the scalar and the <i>exponent k</i> are each encoded as one decimal digit. Pattern: <code>'^[0-9]E-[0-9]\$'</code>  Examples: Packer Error Rate $4 \times 10^{-6}$ shall be encoded as "4E-6". Packer Error Rate $10^{-2}$ shall be encoded as "1E-2".
PacketErrRateRm	string	This data type is defined in the same way as the "PacketErrRate" data type, but with the OpenAPI "nullable: true" property.
PacketLossRate	integer	Unsigned integer indicating Packet Loss Rate (see clauses 5.7.2.8 and 5.7.4 of 3GPP TS 23.501 [8]), expressed in tenth of percent. Minimum = 0. Maximum = 1000.
PacketLossRateRm	integer	This data type is defined in the same way as the "PacketLossRate" data type, but with the OpenAPI "nullable: true" property.
AverWindow	integer	Unsigned integer indicating Averaging Window (see clause 5.7.3.6 and 5.7.4 of 3GPP TS 23.501 [8]), expressed in milliseconds. Minimum = 1. Maximum = 4095. Default = 2000..
AverWindowRm	integer	This data type is defined in the same way as the "AverWindow" data type, but with the OpenAPI "nullable: true" property.
MaxDataBurstVol	integer	Unsigned integer indicating Maximum Data Burst Volume (see clauses 5.7.3.7 and 5.7.4 of 3GPP TS 23.501 [8]), expressed in Bytes. Minimum = 1. Maximum = 4095.
MaxDataBurstVolRm	integer	This data type is defined in the same way as the "MaxDataBurstVol" data type, but with the OpenAPI "nullable: true" property.
SamplingRatio	integer	Unsigned integer indicating Sampling Ratio (see clauses 4.15.1 of 3GPP TS 23.502 [28]), expressed in percent. Minimum = 1. Maximum = 100
SamplingRatioRM	integer	This data type is defined in the same way as the "SamplingRatio" data type, but with the OpenAPI "nullable: true" property.
RgWirelineCharacteristics	Bytes	RG Level Wireline Access Characteristics (see BBF TR-456 [41] and BBF TR-470 [37]). It shall be encoded as a string with format "byte" as defined in OpenAPI Specification [3], i.e. base64 encoded characters, representing the RG-Level Wireline Access Characteristics encoded as specified in clause 7.5 of BBF TR-470 [37].
RgWirelineCharacteristicsRm	Bytes	This data type is defined in the same way as the "RgWirelineCharacteristics" data type, but with the OpenAPI "nullable: true" property.
ExtMaxDataBurstVol	integer	Unsigned integer indicating Maximum Data Burst Volume (see clauses 5.7.3.7 and 5.7.4 of 3GPP TS 23.501 [8]), expressed in Bytes. Minimum = 4096. Maximum = 2000000.
ExtMaxDataBurstVolRm	integer	This data type is defined in the same way as the "ExtMaxDataBurstVol" data type, but with the OpenAPI "nullable: true" property.
ExtPacketDelBudget	integer	Unsigned integer indicating Packet Delay Budget (see clauses 5.7.3.4 and 5.7.4 of 3GPP TS 23.501 [8]), expressed in 0.01 milliseconds. Minimum = 1.
ExtPacketDelBudgetRm	integer	This data type is defined in the same way as the "ExtPacketDelBudget" data type, but with the OpenAPI "nullable: true" property.
Metadata	string	This datatype contains information that is transparently passed to UPF and the UPF provides it to the service functions in N6-LAN.  When present, this IE shall be encoded as a string with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters, representing the Metadata.

NOTE: The prefixes used for bit rate unit "bps", packet rate unit "pps" and traffic volume in byte unit "B" shall be taken as x1000 multipliers and were meant to follow the standard symbols from "The International System of Units" (<https://www.bipm.org/en/measurement-units/si-prefixes>). However, even when the standard symbol for 10<sup>3</sup> multiplier is "k", in the present specification it has been defined as "K", and has been kept as such due to backwards-compatibility with earlier versions of this specification.

## 5.5.3 Enumerations

### 5.5.3.1 Enumeration: PreemptionCapability

The enumeration PreemptionCapability indicates the pre-emption capability of a request on other QoS flows. See clause 5.7.2.2 of 3GPP TS 23.501 [8]. It shall comply with the provisions defined in table 5.5.3.1-1.

**Table 5.5.3.1-1: Enumeration PreemptionCapability**

Enumeration value	Description
"NOT_PREEMPT"	Shall not trigger pre-emption.
"MAY_PREEMPT"	May trigger pre-emption.

### 5.5.3.2 Enumeration: PreemptionVulnerability

The enumeration PreemptionVulnerability indicates the pre-emption vulnerability of the QoS flow to pre-emption from other QoS flows. See clause 5.7.2.2 of 3GPP TS 23.501 [8]. It shall comply with the provisions defined in table 5.5.3.2-1.

**Table 5.5.3.2-1: Enumeration PreemptionVulnerability**

Enumeration value	Description
"NOT_PREEMPTABLE"	Shall not be pre-empted.
"PREEMPTABLE"	May be pre-empted.

### 5.5.3.3 Enumeration: ReflectiveQosAttribute

The enumeration ReflectiveQosAttribute indicates whether certain traffic of the QoS flow may be subject to Reflective QoS (see clause 5.7.2.3 of 3GPP TS 23.501 [8]). It shall comply with the provisions defined in table 5.5.3.3-1.

**Table 5.5.3.3-1: Enumeration ReflectiveQosAttribute**

Enumeration value	Description
"RQOS"	Certain traffic of the QoS flow may be subject to Reflective QoS.
"NO_RQOS"	Traffic of the QoS flow is not subject to Reflective QoS.

### 5.5.3.4 Void

### 5.5.3.5 Enumeration: NotificationControl

The enumeration NotificationControl indicates whether notifications are requested from the RAN when the GFBR can no longer (or again) be fulfilled for a QoS Flow during the lifetime of the QoS Flow (see clause 5.7.2.4 of 3GPP TS 23.501 [8]). It shall comply with the provisions defined in table 5.5.3.5-1.

**Table 5.5.3.5-1: Enumeration NotificationControl**

Enumeration value	Description
"REQUESTED"	Notifications are requested from the RAN.
"NOT_REQUESTED"	Notifications are not requested from the RAN.

### 5.5.3.6 Enumeration: QoSResourceType

The enumeration QoSResourceType indicates whether a QoS Flow is non-GBR, delay critical GBR, or non-delay critical GBR (see clauses 5.7.3.4 and 5.7.3.5 of 3GPP TS 23.501 [8]). It shall comply with the provisions defined in table 5.5.3.6-1.

**Table 5.5.3.6-1: Enumeration QoSResourceType**

Enumeration value	Description
"NON_GBR"	Non-GBR QoS Flow.
"NON_CRITICAL_GBR"	Non-delay critical GBR QoS flow.
"CRITICAL_GBR"	Delay critical GBR QoS flow.

### 5.5.3.7 Enumeration: PreemptionCapabilityRm

This enumeration is defined in the same way as the "PreemptionCapability" enumeration, but with the OpenAPI "nullable: true" property.

### 5.5.3.8 Enumeration: PreemptionVulnerabilityRm

This enumeration is defined in the same way as the "PreemptionVulnerability" enumeration, but with the OpenAPI "nullable: true" property.

### 5.5.3.9 Enumeration: ReflectiveQoSAttributeRm

This enumeration is defined in the same way as the "ReflectiveQoSAttribute" enumeration, but with the OpenAPI "nullable: true" property.

### 5.5.3.10 Enumeration: NotificationControlRm

This enumeration is defined in the same way as the "NotificationControl" enumeration, but with the OpenAPI "nullable: true" property.

### 5.5.3.11 Enumeration: QoSResourceTypeRm

This enumeration is defined in the same way as the "QoSResourceType" enumeration, but with the OpenAPI "nullable: true" property.

### 5.5.3.12 Enumeration: AdditionalQoSFlowInfo

The enumeration AdditionalQoSFlowInfo provides additional QoS flow information (see clause 9.3.1.12 3GPP TS 38.413 [11]). It shall comply with the provisions defined in table 5.5.3.12-1.

**Table 5.5.3.12-1: Enumeration AdditionalQoSFlowInfo**

Enumeration value	Description
"MORE_LIKELY"	Traffic for the QoS flow is likely to appear more often than traffic for other flows established for the PDU session.

### 5.5.3.13 Enumeration: PartitioningCriteria

The enumeration PartitioningCriteria indicates criteria for grouping the UEs (see clause 4.15.1 of 3GPP TS 23.502 [28]). It shall comply with the provisions defined in table 5.5.3.13-1.

**Table 5.5.3.13-1: Enumeration PartitioningCriteria**

Enumeration value	Description
"TAC"	Type Allocation Code
"SUBPLMN"	Subscriber PLMN ID
"GEOAREA"	Geographical area
"SNSSAI"	S-NSSAI
"DNN"	DNN

### 5.5.3.14 Enumeration: PartitioningCriteriaRm

This enumeration is defined in the same way as the "PartitioningCriteria" enumeration, but with the OpenAPI "nullable: true" property.

### 5.5.3.15 Enumeration: PduSetHandlingInfo

The enumeration PduSetHandlingInfo indicates whether all PDUs of the PDU Set are needed for the usage of the PDU Set by the application layer in the receiver side. It shall comply with the provisions defined in table 5.5.3.15-1.

**Table 5.5.3.15-1: Enumeration PduSetHandlingInfo**

Enumeration value	Description
"ALL_PDUS_NEEDED"	All PDUs of the PDU Set are needed.
"ALL_PDUS_NOT_NEEDED"	All PDUs of the PDU Set are not needed.

### 5.5.3.16 Enumeration: MediaTransportProto

**Table 5.5.3.16-1: Enumeration MediaTransportProto**

Enumeration value	Description
"RTP"	Real-time Transport Protocol (see IETF RFC 3550 [61])
"SRTP"	Secure Real-time Transport Protocol (see IETF RFC 3711 [62])
"MOQT"	Media Over QUIC Transport protocol (see IETF draft-ietf-moq-transport [67]).

### 5.5.3.17 Enumeration: RtpHeaderExtType

**Table 5.5.3.17-1: Enumeration RtpHeaderExtType**

Enumeration value	Description
"PDU_SET_MARKING"	RTP header extension for PDU Set Marking (see clause 4.4.2 of 3GPP TS 26.522 [59])
"DYN_CHANGING_TRAFFIC_CHAR"	RTP header extension for Dynamically changing traffic characteristics (see clause 4.5 of 3GPP TS 26.522 [59])
"EXPEDITED_TRANSFER_IND"	RTP header extension for Expedited Transfer Indication (see clause 4.7 of 3GPP TS 26.522 [59])

## 5.5.3.18 Enumeration: RtpPayloadFormat

**Table 5.5.3.18-1: Enumeration RtpPayloadFormat**

Enumeration value	Description
"H264"	RTP payload format for H.264/AVC codec (see IETF RFC 6184 [63])
"H265"	RTP payload format for H.265/HEVC codec (see IETF RFC 7798 [64])

## 5.5.3.19 Enumeration: MediaTransportProtoRm

This data type is defined in the same way as the "MediaTransportProto" data type, but with the OpenAPI "nullable: true" property.

## 5.5.3.20 Enumeration: RtpHeaderExtTypeRm

This data type is defined in the same way as the "RtpHeaderExtType" data type, but with the OpenAPI "nullable: true" property.

## 5.5.3.21 Enumeration: RtpPayloadFormatRm

This data type is defined in the same way as the "RtpPayloadFormat" data type, but with the OpenAPI "nullable: true" property.

## 5.5.3.22 Enumeration: PduSetHandlingInfoRm

This enumeration is defined in the same way as the "PduSetHandlingInfo" enumeration, but with the OpenAPI "nullable: true" property.

## 5.5.3.23 Enumeration: MriTransferMethod

**Table 5.5.3.23-1: Enumeration MriTransferMethod**

Enumeration value	Description
"UDP_OPTION"	Media related information is transferred using the UDP Option method.

## 5.5.3.24 Enumeration: MriTransferMethodRm

This data type is defined in the same way as the "MriTransferMethod" data type, but with the OpenAPI "nullable: true" property.

## 5.5.4 Structured Data Types

### 5.5.4.1 Type: Arp

**Table 5.5.4.1-1: Definition of type Arp**

Attribute name	Data type	P	Cardinality	Description
priorityLevel	ArpPriorityLevel	M	1	Defines the relative importance of a resource request.
preemptCap	PreemptionCapability	M	1	Defines whether a service data flow may get resources that were already assigned to another service data flow with a lower priority level.
preemptVuln	PreemptionVulnerability	M	1	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.

### 5.5.4.2 Type: Ambr

**Table 5.5.4.2-1: Definition of type Ambr**

Attribute name	Data type	P	Cardinality	Description
uplink	BitRate	M	1	AMBR for uplink
downlink	BitRate	M	1	AMBR for downlink

## 5.5.4.3 Type: Dynamic5Qi

Table 5.5.4.3-1: Definition of type Dynamic5Qi

Attribute name	Data type	P	Cardinality	Description	Applicability
resourceType	QosResourceType	M	1	Defines the 5QI resource type. See clause 5.5.3.6.	
priorityLevel	5QIPriorityLevel	M	1	Defines the 5QI Priority Level. See clause 5.5.2.	
packetDelayBudget	PacketDelBudget	M	1	Defines the packet delay budget. See clause 5.5.2. See NOTE 3.	
packetErrRate	PacketErrRate	M	1	Defines the packet error rate. See clause 5.5.2.	
averWindow	AverWindow	C	0..1	Defines the averaging window. See clause 5.5.2. This IE shall be present only for a GBR QoS flow or a Delay Critical GBR QoS flow.	
maxDataBurstVol	MaxDataBurstVol	C	0..1	Defines the maximum data burst volume. See clause 5.5.2. See NOTE 1, NOTE 2. This IE shall be present for a Delay Critical GBR QoS flow.	
extMaxDataBurstVol	ExtMaxDataBurstVol	C	0..1	Defines the maximum data burst volume. See clause 5.5.2. See NOTE 1, NOTE 2.	
extPacketDelBudget	ExtPacketDelBudget	O	0..1	Defines the packet delay budget. See clause 5.5.2. See NOTE 3.	
cnPacketDelayBudgetDI	ExtPacketDelBudget	O	0..1	Defines the Core Network Packet Delay Budget for downlink. See clause 5.5.2.	
cnPacketDelayBudgetUI	ExtPacketDelBudget	O	0..1	Defines the Core Network Packet Delay Budget for uplink. See clause 5.5.2.	
<p>NOTE 1: Unless specified otherwise in an API: if the maximum data burst volume value to be transmitted is lower than or equal to 4095 Bytes, the maxDataBurst Vol IE shall be set to the maximum data burst volume value to be transmitted and the extMaxDataBurstVol IE shall be omitted. If the maximum data burst volume value to be transmitted is greater than 4095 Bytes, the maxDataBurst Vol IE shall be set to 4095 Bytes and, if ExtMaxDataBurstVol data type is supported by the sender, the extMaxDataBurstVol IE shall be set to the maximum data burst volume value to be transmitted.</p> <p>NOTE 2: Unless specified otherwise in an API: if both the maxDataBurstVol IE and the extMaxDataBurstVol IE are received, the value in the extMaxDataBurstVol IE shall be used if the receiver supports ExtMaxDataBurstVol data type, otherwise the value in the maxDataBurstVol IE shall be used.</p> <p>NOTE 3: Unless specified otherwise in an API: if both the packetDelayBudget IE and the extPacketDelBudget IE are received, the value in the extPacketDelBudget IE shall be used if the receiver supports ExtPacketDelBudget data type, otherwise the value in the packetDelayBudget IE shall be used.</p>					

## 5.5.4.4 Type: NonDynamic5Qi

Table 5.5.4.4-1: Definition of type NonDynamic5Qi

Attribute name	Data type	P	Cardinality	Description	Applicability
priorityLevel	5QIPriorityLevel	O	0..1	Defines the 5QI Priority Level. See clause 5.5.2. When present, it contains the 5QI Priority Level value that overrides the standardized or pre-configured value.	
averWindow	AverWindow	O	0..1	Defines the averaging window. See clause 5.5.2. This IE may be present for a GBR QoS flow or a Delay Critical GBR QoS flow. When present, it contains the Averaging Window that overrides the standardized or pre-configured value.	
maxDataBurstVol	MaxDataBurstVol	O	0..1	Defines the maximum data burst volume. See clause 5.5.2. This IE may be present for a Delay Critical GBR QoS flow. When present, it contains the Maximum Data Burst Volume value that overrides the standardized or pre-configured value. See NOTE 1, NOTE 2.	
extMaxDataBurstVol	ExtMaxDataBurstVol	C	0..1	Defines the maximum data burst volume. See clause 5.5.2. This IE may be present for a Delay Critical GBR QoS flow. When present, it contains the Maximum Data Burst Volume value that overrides the standardized or pre-configured value. See NOTE 1, NOTE 2.	
cnPacketDelayBudgetDI	ExtPacketDelayBudget	O	0..1	Defines the Core Network Packet Delay Budget for downlink. See clause 5.5.2.	
cnPacketDelayBudgetUI	ExtPacketDelayBudget	O	0..1	Defines the Core Network Packet Delay Budget for uplink. See clause 5.5.2.	
<p>NOTE 1: Unless specified otherwise in an API: if the maximum data burst volume value to be transmitted is lower than or equal to 4095 Bytes, the maxDataBurstVol IE shall be set to the maximum data burst volume value to be transmitted and the extMaxDataBurstVol IE shall be omitted. If the maximum data burst volume value to be transmitted is greater than 4095 Bytes, the maxDataBurstVol IE shall be set to 4095 Bytes and, if ExtMaxDataBurstVol data type is supported by the sender, the extMaxDataBurstVol IE shall be set to the maximum data burst volume value to be transmitted.</p> <p>NOTE 2: Unless specified otherwise in an API: if both the maxDataBurstVol IE and the extMaxDataBurstVol IE are received, the value in the extMaxDataBurstVol IE shall be used if the receiver supports ExtMaxDataBurstVol data type, otherwise the value in the maxDataBurstVol IE shall be used.</p>					

## 5.5.4.5 Type: ArpRm

This data type is defined in the same way as the "Arp" data type, but with the OpenAPI "nullable: true" property.

## 5.5.4.6 Type: AmbrRm

This data type is defined in the same way as the "Ambr" data type, but with the OpenAPI "nullable: true" property.

## 5.5.4.7 Void

5.5.4.8 Void

5.5.4.9 Type: SliceMbr

**Table 5.5.4.9-1: Definition of type SliceMbr**

Attribute name	Data type	P	Cardinality	Description
uplink	BitRate	M	1	MBR for uplink
downlink	BitRate	M	1	MBR for downlink

5.5.4.10 Type: SliceMbrRm

This data type is defined in the same way as the "SliceMbr" data type, but with the OpenAPI "nullable: true" property.

5.5.4.11 Type: PduSetQosPara

**Table 5.5.4.11-1: Definition of type PduSetQosPara**

Attribute name	Data type	P	Cardinality	Description	Applicability
pduSetDelayBudget	ExtPacketDelBudget	C	0..1	Indicates the PDU Set Delay Budget (PSDB) (see clause 5.7.7.2 of 3GPP TS 23.501 [8]). (NOTE)	
pduSetErrRate	PacketErrRate	C	0..1	Indicates the PDU Set Error Rate (PSER) (see clause 5.7.7.3 3GPP TS 23.501 [8]). (NOTE)	
pduSetHandlingInfo	PduSetHandlingInfo	C	0..1	Indicates whether all PDUs of the PDU Set are needed for the usage of the PDU Set by the application layer in the receiver side. (NOTE)	

NOTE: At least one of the following shall be present: 1) pduSetHandlingInfo and/or 2) both pduSetDelayBudget and pduSetErrRate.

5.5.4.12 Type: PduSetQosParaRm

This data type is defined in the same way as the "PduSetQosPara" data type, but with the OpenAPI "nullable: true" property and with the "pduSetDelayBudget" attribute with the removable data type "ExtPacketDelBudgetRm", the "pduSetErrRate" attribute with the removable data type "PacketErrRateRm" and the "pduSetHandlingInfo" attribute with the removable data type "PduSetHandlingInfoRm".

**Table 5.5.4.12-1: Definition of type PduSetQosParaRm**

Attribute name	Data type	P	Cardinality	Description
pduSetDelayBudget	ExtPacketDelBudgetRm	C	0..1	Indicates the PDU Set Delay Budget (PSDB) (see clause 5.7.7.2 of 3GPP TS 23.501 [8]). (NOTE 1, NOTE 2)
pduSetErrRate	PacketErrRateRm	C	0..1	Indicates the PDU Set Error Rate (PSER) (see clause 5.7.7.3 3GPP TS 23.501 [8]). (NOTE 1, NOTE 2)
pduSetHandlingInfo	PduSetHandlingInfoRm	C	0..1	Indicates whether all PDUs of the PDU Set are needed for the usage of the PDU Set by the application layer in the receiver side. (NOTE 2)

NOTE 1: The pduSetDelayBudget and pduSetErrRate shall only be removed at the same time.  
NOTE 2: When the PduSetQosParaRm is used to initially provision the PDU Set QoS parameters the PduSetQosParamRm shall contain at least one of the following:  
1) pduSetHandlingInfo and/or 2) both pduSetDelayBudget and pduSetErrRate.  
When the PduSetQosParaRm is used to modify the previously provisioned value(s), only the attribute(s) to be modified shall be present, e.g. only the pduSetErrRate is present when the value of the pduSetErrRate is to be changed but there is no change for the pduSetDelayBudget and the pduSetHandlingInfo attributes.

## 5.5.4.13 Type ProtocolDescription

Table 5.5.4.13-1: Definition of type ProtocolDescription

Attribute name	Data type	P	Cardinality	Description
transportProto	MediaTransportProto	O	0..1	When present, this IE shall indicate the transport protocol used by the media flow.
rtpHeaderExtInfo	RtpHeaderExtInfo	C	0..1	This IE shall be present if RTP or SRTP is used and the RTP payload packets contains a RTP Header Extension that can be used for PDU Set identification, End of Data Burst marking, Data Burst Size marking, Time to Next Burst marking and/or Expedited Transfer Indication marking.  When present, this IE shall contain information on the RTP header extension that can be used for PDU Set identification, End of Data Burst marking, Data Burst Size marking, Time to Next Burst marking and/or Expedited Transfer Indication marking. (NOTE 1) (NOTE 4)
addRtpHeaderExtInfo	array(RtpHeaderExtInfo)	O	1..N	This IE may be present if the rtpHeaderExtInfo IE is present. When present, it shall contain information on additional RTP header extensions that can be used for PDU Set identification, End of Data Burst marking, Data Burst Size marking, Time to Next Burst marking and/or Expedited Transfer Indication marking. (NOTE 4)
rtpPayloadInfoList	array(RtpPayloadInfo)	O	1..N	When present, it shall contain RTP Payload information for the RTP stream, which can be used to derive the PDU Set information, End of Data Burst marking, Data Burst Size marking, Time to Next Burst marking and/or Expedited Transfer Indication marking. (NOTE 1) (NOTE 2)
mriTransferInfo	MriTransferInfo	O	0..1	This IE may be present, for end-to-end encrypted traffic, to indicate how media related information is transferred.
<p>NOTE 1: If the rtpPayloadInfoList is present and contains one or more Payload Type values, the UPF may only parse the RTP packets with an RTP header containing any of these Payload Type value(s). Otherwise, if the rtpPayloadInfoList is absent or does not contain any Payload Type value, the UPF should parse all the RTP packets of the media flow and use either the RTP Header Extension if included, or the Payload format to derive the PDU set information (see Guidelines for PDU Set identification in clauses A.1 and A.2 of 3GPP TS 26.522 [59]).</p> <p>NOTE 2: In this release of the specification, the rtpPayloadInfoList contains only one RtpPayloadInfo element.</p> <p>NOTE 3: Vendor/operator specific attributes may be supported as defined in clause 6.6.3 of 3GPP TS 29.500 [25].</p> <p>NOTE 4: If at least two RTP header extensions are signaled in the ProtocolDescription, the RTP header extension for PDU Set identification and/or End of Data Burst marking (if any) should be signaled in the rtpHeaderExtInfo attribute (implementations complying with an earlier release of the specification may support PDU set identification and/or End of Data Burst marking without supporting the addRtpHeaderExtInfo attribute).</p>				

EXAMPLE 1: For a media flow using RTP transport with:

- the RTP Header Extension for PDU Set Marking (see clause 4.4.2 of 3GPP TS 26.522 [59]);
- the RTP header extension Id "3";
- RTP packets with different PTs, where packets with PT 96 contain the RTP Header Extension,

the Protocol Description is set to:

```
{ "transportProto": "RTP", "rtpHeaderExtInfo": { "rtpHeaderExtType": "PDU_SET_MARKING",
"rtpHeaderExtId": 3 }, "rtpPayloadInfoList": [{ "rtpPayloadTypeList": [ 96 ]}]}
```

EXAMPLE 2: For a media flow using RTP transport:  
 - not using any RTP Header Extension for PDU Set identification;  
 - H.265 payload format with Payload Types 96 and 97 (see clause A.2.3 (RTP with HEVC payload format) of 3GPP TS 26.522 [59]);

the Protocol Description is set to:

```
{ "transportProto": "RTP", "rtpPayloadInfoList": [{ "rtpPayloadFormat": "H265",
"rtpPayloadTypeList": [96, 97]}]}
```

EXAMPLE 3: For a media flow using RTP transport with:  
 - the RTP Header Extension for PDU Set Marking (see clause 4.4.2 of 3GPP TS 26.522 [59]);  
 - the RTP Header Extension for Dynamically changing traffic characteristics (see clause 4.5 of 3GPP TS 26.522 [59]);  
 - the RTP header extension Id "3" and "4" for the above RTP header extensions respectively;  
 - RTP packets with different PTs, where packets with PT 96 contain the RTP Header Extensions,

the Protocol Description is set to:

```
{ "transportProto": "RTP", "rtpHeaderExtInfo": { "rtpHeaderExtType": "PDU_SET_MARKING",
"rtpHeaderExtId": 3 }, "addRtpHeaderExtInfo": [{ "rtpHeaderExtType":
"DYN_CHANGING_TRAFFIC_CHAR", "rtpHeaderExtId": 4}], "rtpPayloadInfoList": [{
"rtpPayloadTypeList": [ 96 ]}]}
```

#### 5.5.4.13A Type ProtocolDescriptionRm

Describes the modifications to the "ProtocolDescription" data type. This data type is defined in the same way as the "ProtocolDescription" data type, but:

- with the OpenAPI "nullable: true" property;
- the removable attributes "transportProto", "rtpHeaderExtInfo" and "mriTransferInfo" with the removable data types "MediaTransportProtoRm", "RtpHeaderExtInfoRm" and "MriTransferInfoRm" respectively; and
- the removable attribute "rtpPayloadInfoList" with the OpenAPI "nullable: true" property.

Table 5.5.4.13A-1: Definition of type ProtocolDescriptionRm

Attribute name	Data type	P	Cardinality	Description
transportProto	MediaTransportProtoRm	O	0..1	When present, this IE shall indicate the transport protocol used by the media flow.
rtpHeaderExtInfo	RtpHeaderExtInfoRm	O	0..1	When present, this IE shall contain information on the RTP header extension that can be used for PDU Set identification, End of Data Burst marking, Data Burst Size marking, Time to Next Burst marking, and/or Expedited Transfer Indication marking.
addRtpHeaderExtInfo	array(RtpHeaderExtInfo)	O	1..N	This IE may be present if the rtpHeaderExtInfo IE is present. When present, it shall contain information on additional RTP header extensions that can be used for PDU Set identification, End of Data Burst marking, Data Burst Size marking, Time to Next Burst marking and/or Expedited Transfer Indication marking. (NOTE)
rtpPayloadInfoList	array(RtpPayloadInfo)	O	1..N	When present, it shall contain RTP Payload information for the RTP stream, which can be used to derive the PDU Set information, End of Data Burst marking, Data Burst Size marking, Time to Next Burst marking, and/or Expedited Transfer Indication marking.
mriTransferInfo	MriTransferInfoRm	O	0..1	This IE may be present, for end-to-end encrypted traffic, to indicate how media related information is transferred.
NOTE: If at least two RTP header extensions are signaled in the ProtocolDescriptionRm, the RTP header extension for PDU Set identification and/or End of Data Burst marking (if any) should be signaled in the rtpHeaderExtInfo attribute (implementations complying with an earlier release of the specification may support PDU set identification and/or End of Data Burst marking without supporting the addRtpHeaderExtInfo attribute).				

5.5.4.14 Type RtpHeaderExtInfo

**Table 5.5.4.14-1: Definition of type RtpHeaderExtInfo**

Attribute name	Data type	P	Cardinality	Description
rtpHeaderExtType	RtpHeaderExtType	C	0..1	<p>This IE shall be present if RTP or SRTP is used and the RTP payload packets contains a RTP Header Extension that can be used for:</p> <ul style="list-style-type: none"> <li>- PDU Set identification and/or End of Data Burst marking;</li> <li>- Data Burst Size marking and/or Time to Next Burst marking; or</li> <li>- Expedited Transfer Indication marking.</li> </ul> <p>When present, it shall indicate the RTP header extension type.</p>
rtpHeaderExtId	integer	C	0..1	<p>Integer between and including 1 and 255.</p> <p>This IE shall be present if the rtpHeaderExtType IE is present.</p> <p>When present, the rtpHeaderExtId shall be set to the Id of the RTP header extension identified by the rtpHeaderExtType IE, as defined in IETF RFC 8285 [60].</p>
longFormat	boolean	O	0..1	<p>This IE may be present if the rtpHeaderExtType is set to "PDU_SET_MARKING", "DYN_CHANGING_TRAFFIC_CHAR" or "EXPEDITED_TRANSFER_IND".</p> <p>When present, this IE shall indicate if a short or a long header extension format is used.</p> <p>true: 2-byte (long) format is used false: 1-byte (short) format is used</p> <p>The absence of this IE means that this information is not known.</p>
pduSetSizeActive	boolean	O	0..1	<p>This IE may be present if the rtpHeaderExtType is set to "PDU_SET_MARKING".</p> <p>When present, this IE shall indicate if the PDU Set size in bytes is present in the RTP header extension of every RTP packet.</p> <p>true: PDU Set size is present false: PDU Set size is not present</p> <p>The absence of this IE means that this information is not known.</p>
pduSetPduCountActive	boolean	O	0..1	<p>This IE may be present if the rtpHeaderExtType is set to "PDU_SET_MARKING".</p> <p>When present, this IE shall indicate if the number of PDUs of a PDU Set is present in the RTP header extension of every RTP packet.</p> <p>true: Number of PDUs of PDU Set is present false: Number of PDUs of PDU Set is not present</p> <p>The absence of this IE means that this information is not known.</p>

NOTE: Vendor/operator specific attributes may be supported as defined in clause 6.6.3 of 3GPP TS 29.500 [25].

#### 5.5.4.14A Type RtpHeaderExtInfoRm

Describes the modifications to "RtpHeaderExtInfo" data type. This data type is defined in the same way as the "RtpHeaderExtInfo" data type, but:

- with the OpenAPI "nullable: true" property;
- the removable attribute "rtpHeaderExtType" with the removable data type "RtpHeaderExtTypeRm"; and
- the removable attributes "rtpHeaderExtId", "longFormat" and "pduSetSizeActive" with the OpenAPI "nullable: true" property.

Table 5.5.4.14A-1: Definition of type RtpHeaderExtInfoRm

Attribute name	Data type	P	Cardinality	Description
rtpHeaderExtType	RtpHeaderExtTypeRm	O	0..1	When present, it shall indicate the RTP header extension type.
rtpHeaderExtId	integer	C	0..1	Integer between and including 1 and 255.  This IE shall be present if the rtpHeaderExtType IE is present.  When present, the rtpHeaderExtId shall be set to the Id of the RTP header extension identified by the rtpHeaderExtType IE, as defined in IETF RFC 8285 [60].
longFormat	boolean	O	0..1	This IE may be present if the rtpHeaderExtType is set to "PDU_SET_MARKING", "DYN_CHANGING_TRAFFIC_CHAR" or "EXPEDITED_TRANSFER_IND".  When present, this IE shall indicate if a short or a long header extension format is used.  true: 2-byte (long) format is used false: 1-byte (short) format is used
pduSetSizeActive	boolean	O	0..1	This IE may be present if the rtpHeaderExtType is set to "PDU_SET_MARKING".  When present, this IE shall indicate if the PDU Set size in bytes is present in the RTP header extension of every RTP packet.  true: PDU Set size is present false: PDU Set size is not present
pduSetPduCountActive	boolean	O	0..1	This IE may be present if the rtpHeaderExtType is set to "PDU_SET_MARKING".  When present, this IE shall indicate if the number of PDUs of a PDU Set is present in the RTP header extension of every RTP packet.  true: Number of PDUs of PDU Set is present false: Number of PDUs of PDU Set is not present  The absence of this IE means that this information is not known.

NOTE: Vendor/operator specific attributes may be supported as defined in clause 6.6.3 of 3GPP TS 29.500 [25].

## 5.5.4.15 Type RtpPayloadInfo

Table 5.5.4.15-1: Definition of type RtpPayloadInfo

Attribute name	Data type	P	Cardinality	Description
rtpPayloadTypeList	array(integer)	C	1..N	Integer between and including 0 and 127.  This IE shall be present when the rtpPayloadFormat is present, otherwise it may be present.  When present, this IE shall contain the list of Payload Type (PT) values in the RTP header of RTP packets the UPF may parse to derive the PDU Set Information, End of Data Burst marking, Data Burst Size marking, Time to Next Burst marking and/or Expedited Transfer Indication marking. (NOTE)
rtpPayloadFormat	RtpPayloadFormat	O	0..1	When present, it shall indicate the RTP Payload format as defined in 3GPP TS 26.522 [59]. (NOTE)
NOTE: The rtpPayloadType(s) shall correspond to the RTP Payload Format if the rtpPayloadFormat is present.				

## 5.5.4.16 Type RtpPayloadInfoRm

Describes the modifications to the "ProtocolDescription" data type. This data type is defined in the same way as the "RtpPayloadInfo" data type, but:

- with the OpenAPI "nullable: true" property;
- the removable attribute "rtpPayloadFormat" with the removable data type "RtpPayloadFormatRm"; and
- the removable attribute "rtpPayloadTypeList" with the OpenAPI "nullable: true" property.

Table 5.5.4.16-1: Definition of type RtpPayloadInfoRm

Attribute name	Data type	P	Cardinality	Description
rtpPayloadTypeList	array(integer)	O	1..N	Integer between and including 0 and 127.  When present, this IE shall contain the list of Payload Type (PT) values in the RTP header of RTP packets the UPF may parse to derive the PDU Set Information, End of Data Burst marking, Data Burst Size marking, Time to Next Burst marking and/or Expedited Transfer Indication marking. (NOTE)
rtpPayloadFormat	RtpPayloadFormatRm	O	0..1	When present, it shall indicate the RTP Payload format as defined in 3GPP TS 26.522 [59]. (NOTE)
NOTE: The rtpPayloadType(s) shall correspond to the RTP Payload Format if the rtpPayloadFormat is present.				

### 5.5.4.17 Type MriTransferInfo

**Table 5.5.4.17-1: Definition of type MriTransferInfo**

Attribute name	Data type	P	Cardinality	Description
transferMethod	MriTransferMethod	O	0..1	Method for transferring media related information, e.g. using the UDP Option method.

### 5.5.4.18 Type MriTransferInfoRm

Describes the modifications to the "MriTransferInfo" data type. This data type is defined in the same way as the "MriTransferInfo" data type, but:

- with the OpenAPI "nullable: true" property; and
- the removable attribute "transferMethod" with the removable data type "MriTransferMethodRm".

**Table 5.5.4.18-1: Definition of type MriTransferInfoRm**

Attribute name	Data type	P	Cardinality	Description
transferMethod	MriTransferMethodRm	O	0..1	Method for transferring media related information, e.g. using the UDP Option method.

## 5.6 Data Types related to 5G Trace

### 5.6.1 Introduction

This clause defines common data types related to 5G Trace.

### 5.6.2 Simple Data Types

This clause specifies common simple data types.

Table 5.6.2-1: Simple Data Types

Type Name	Type Definition	Description
PhysCellId	integer	integer value identifying the physical cell identity (PCI), as definition of " <i>PhysCellId</i> " IE in clause 6.3.2 of 3GPP TS 38.331 [42].  Minimum = 0. Maximum = 1007.
ArfcnValueNR	integer	Integer value indicating the ARFCN applicable for a downlink, uplink or bi-directional (TDD) NR global frequency raster, as definition of " <i>ARFCN-ValueNR</i> " IE in clause 6.3.2 of 3GPP TS 38.331 [42].  Minimum = 0. Maximum = 3279165.
QoeReference	string	String containing MCC (3 digits), MNC (2 or 3 digits) and QMC ID (3 octets, encoded as 6 hexadecimal digits). Each value is separated by the "-" character.  See 3GPP TS 28.405 [56], clause 5.2.  Pattern: '^[0-9]{3}-[0-9]{2,3}-[A-Fa-f0-9]{6}\$'
MdtAlignmentInfo	string	String containing: - Trace Reference: MCC (3 digits), MNC (2 or 3 digits), Trace ID (3 octets, encoded as 6 hexadecimal digits) - Trace Recording Session Reference (2 octets, encoded as 4 hexadecimal digits). Each value is separated by the "-" character.  See 3GPP TS 28.405 [56], clause 5.13.  Pattern: '^[0-9]{3}-[0-9]{2,3}-[A-Fa-f0-9]{6}-[A-Fa-f0-9]{4}\$'

## 5.6.3 Enumerations

### 5.6.3.1 Enumeration: TraceDepth

The enumeration TraceDepth defines how detailed information should be recorded in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.1-1.

Table 5.6.3.1-1: Enumeration TraceDepth

Enumeration value	Description
"MINIMUM"	Minimum
"MEDIUM"	Medium
"MAXIMUM"	Maximum
"MINIMUM_WO_VENDOR_EXTENSION"	Minimum without vendor specific extension
"MEDIUM_WO_VENDOR_EXTENSION"	Medium without vendor specific extension
"MAXIMUM_WO_VENDOR_EXTENSION"	Maximum without vendor specific extension

### 5.6.3.2 Enumeration: TraceDepthRm

This enumeration is defined in the same way as the "TraceDepth" enumeration, but with the OpenAPI "nullable: true" property.

### 5.6.3.3 Enumeration: JobType

The enumeration JobType defines Job Type in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.3-1.

**Table 5.6.3.3-1: Enumeration JobType**

Enumeration value	Description
"IMMEDIATE_MDT_ONLY"	Immediate MDT only
"LOGGED_MDT_ONLY"	Logged MDT only
"TRACE_ONLY"	Trace only
"IMMEDIATE_MDT_AND_TRACE"	Immediate MDT and Trace
"LOGGED_MBSFN_MDT"	Logged MBSFN MDT
"5GC_UE_LEVEL_MEASUREMENTS_ONLY"	5GC UE level measurements only
"TRACE_AND_5GC_UE_LEVEL_MEASUREMENTS_ONLY"	Trace and 5GC UE level measurements
"IMMEDIATE_MDT_AND_5GC_UE_LEVEL_MEASUREMENTS"	Immediate MDT and 5GC UE level measurements
"TRACE_IMMEDIATE_MDT_AND_5GC_UE_LEVEL_MEASUREMENTS"	Trace, Immediate MDT and 5GC UE level measurements

#### 5.6.3.4 Enumeration: ReportTypeMdt

The enumeration ReportTypeMdt defines Report Type for logged MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.4-1.

**Table 5.6.3.4-1: Enumeration ReportTypeMdt**

Enumeration value	Description
"PERIODICAL"	Periodical
"EVENT_TRIGGERED"	Event triggered

#### 5.6.3.5 Enumeration: MeasurementLteForMdt

The enumeration MeasurementLteForMdt defines Measurements used for MDT in LTE in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.5-1.

**Table 5.6.3.5-1: Enumeration MeasurementLteForMdt**

Enumeration value	Description
"M1"	M1
"M2"	M2
"M3"	M3
"M4_DL"	M4 for DL
"M4_UL"	M4 for UL
"M5_DL"	M5 for DL
"M5_UL"	M5 for UL
"M6_DL"	M6 for DL
"M6_UL"	M6 for UL
"M7_DL"	M7 for DL
"M7_UL"	M7 for UL
"M8"	M8
"M9"	M9

#### 5.6.3.6 Enumeration: MeasurementNrForMdt

The enumeration MeasurementNrForMdt defines Measurements used for MDT in NR in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.6-1.

**Table 5.6.3.6-1: Enumeration MeasurementNrForMdt**

Enumeration value	Description
"M1"	M1
"M2"	M2
"M3"	M3
"M4_DL"	M4 for DL
"M4_UL"	M4 for UL
"M5_DL"	M5 for DL
"M5_UL"	M5 for UL
"M6_DL"	M6 for DL
"M6_UL"	M6 for UL
"M7_DL"	M7 for DL
"M7_UL"	M7 for UL
"M8"	M8
"M9"	M9

### 5.6.3.7 Enumeration: SensorMeasurement

The enumeration SensorMeasurement defines sensor measurement type for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.7-1.

**Table 5.6.3.7-1: Enumeration SensorMeasurement**

Enumeration value	Description
"BAROMETRIC_PRESSURE"	Barometric pressure
"UE_SPEED"	UE speed
"UE_ORIENTATION"	UE orientation

### 5.6.3.8 Enumeration: ReportingTrigger

The enumeration ReportingTrigger defines Reporting Triggers for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.8-1.

**Table 5.6.3.8-1: Enumeration ReportingTrigger**

Enumeration value	Description
"PERIODICAL"	Periodical
"EVENT_A2"	Event A2 for LTE and NR
"EVENT_A2_PERIODIC"	A2 event triggered periodic for LTE and NR
"ALL_RRM_EVENT_TRIGGERS"	All configured RRM event triggers for LTE

### 5.6.3.9 Enumeration: ReportIntervalMdt

The enumeration ReportIntervalMdt defines Report Interval for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.9-1.

**Table 5.6.3.9-1: Enumeration ReportIntervalMdt**

Enumeration value	Description
"120"	120 ms
"240"	240 ms
"480"	480 ms
"640"	640 ms
"1024"	1024 ms
"2048"	2048 ms
"5120"	5120 ms
"10240"	10240ms
"60000"	1 min=60000 ms
"360000"	6 min=360000 ms
"720000"	12 min=720000 ms
"1800000"	30 min=1800000 ms
"3600000"	60 min=3600000 ms

### 5.6.3.10 Enumeration: ReportAmountMdt

The enumeration ReportAmountMdt defines Report Amount for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.10-1.

**Table 5.6.3.10-1: Enumeration ReportAmountMdt**

Enumeration value	Description
"1"	1
"2"	2
"4"	4
"8"	8
"16"	16
"32"	32
"64"	64
"infinity"	Infinity

### 5.6.3.11 Enumeration: EventForMdt

The enumeration EventForMdt defines events triggered measurement for logged MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.11-1.

**Table 5.6.3.11-1: Enumeration EventForMdt**

Enumeration value	Description
"OUT_OF_COVERAGE"	Out of coverage
"A2_EVENT"	A2 event

### 5.6.3.12 Enumeration: LoggingIntervalMdt

The enumeration LoggingIntervalMdt defines Logging Interval for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.12-1.

**Table 5.6.3.12-1: Enumeration LoggingIntervalMdt**

Enumeration value	Description
"128"	1280 ms
"256"	2560 ms
"512"	5120 ms
"1024"	10240 ms
"2048"	20480 ms
"3072"	30720 ms
"4096"	40960 ms
"6144"	61440 ms

### 5.6.3.13 Enumeration: LoggingDurationMdt

The enumeration LoggingDurationMdt defines Logging Duration for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.13-1.

**Table 5.6.3.13-1: Enumeration LoggingDurationMdt**

Enumeration value	Description
"600"	600 sec
"1200"	1200 sec
"2400"	2400 sec
"3600"	3600 sec
"5400"	5400 sec
"7200"	7200 sec

### 5.6.3.14 Enumeration: PositioningMethodMdt

The enumeration PositioningMethodMdt defines Positioning Method for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.14-1.

**Table 5.6.3.14-1: Enumeration PositioningMethodMdt**

Enumeration value	Description
"GNSS"	GNSS
"E_CELL_ID"	E-Cell ID

### 5.6.3.15 Enumeration: CollectionPeriodRmmLteMdt

The enumeration CollectionPeriodRmmLteMdt defines Collection period for RRM measurements LTE for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.15-1.

**Table 5.6.3.15-1: Enumeration CollectionPeriodRmmLteMdt**

Enumeration value	Description
"1024"	1024 ms
"1280"	1280 ms
"2048"	2048 ms
"2560"	2560 ms
"5120"	5120 ms
"10240"	10240 ms
"60000"	1 min

### 5.6.3.16 Enumeration: MeasurementPeriodLteMdt

The enumeration MeasurementPeriodLteMdt defines Measurement period LTE for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.16-1.

**Table 5.6.3.16-1: Enumeration MeasurementPeriodLteMdt**

Enumeration value	Description
"1024"	1024 ms
"1280"	1280 ms
"2048"	2048 ms
"2560"	2560 ms
"5120"	5120 ms
"10240"	10240 ms
"60000"	1 min

### 5.6.3.17 Enumeration: ReportIntervalNrMdt

The enumeration ReportIntervalNrMdt defines Report Interval in NR for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.17-1.

**Table 5.6.3.17-1: Enumeration ReportIntervalNrMdt**

Enumeration value	Description
"120"	120 ms
"240"	240 ms
"480"	480 ms
"640"	640 ms
"1024"	1024 ms
"2048"	2048 ms
"5120"	5120 ms
"10240"	10240ms
"20480"	20480ms
"40960"	40960ms
"60000"	1 min=60000 ms
"360000"	6 min=360000 ms
"720000"	12 min=720000 ms
"1800000"	30 min=1800000 ms
"3600000"	60 min=3600000 ms

### 5.6.3.18 Enumeration: LoggingIntervalNrMdt

The enumeration LoggingIntervalNrMdt defines Logging Interval in NR for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.18-1.

**Table 5.6.3.18-1: Enumeration LoggingIntervalNrMdt**

Enumeration value	Description
"1280"	1280 ms
"2560"	2560 ms
"5120"	5120 ms
"10240"	10240 ms
"20480"	20480 ms
"30720"	30720 ms
"40960"	40960 ms
"61440"	61440 ms
"320"	320 ms
"640"	640 ms
"infinity"	Infinity

### 5.6.3.19 Enumeration: CollectionPeriodRmmNrMdt

The enumeration CollectionPeriodRmmNrMdt defines Collection period for RRM measurements NR for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.19-1.

**Table 5.6.3.19-1: Enumeration CollectionPeriodRmmNrMdt**

Enumeration value	Description
"1024"	1024 ms
"2048"	2048 ms
"5120"	5120 ms
"10240"	10240 ms
"60000"	1 min

### 5.6.3.20 Enumeration: LoggingDurationNrMdt

The enumeration LoggingDurationMdt defines Logging Duration in NR for MDT in the trace. See 3GPP TS 32.422 [19] for further description of the values. It shall comply with the provisions defined in table 5.6.3.20-1.

**Table 5.6.3.20-1: Enumeration LoggingDurationNrMdt**

Enumeration value	Description
"600"	600 sec
"1200"	1200 sec
"2400"	2400 sec
"3600"	3600 sec
"5400"	5400 sec
"7200"	7200 sec

### 5.6.3.21 Enumeration: QoeServiceType

The enumeration QoeServiceType indicates the kind of service that shall be recorded for QMC. It shall comply with the provisions defined in Table 5.6.3.21-1.

**Table 5.6.3.21-1: Enumeration QoeServiceType**

Enumeration value	Description
"DASH"	Dynamic Adaptive Streaming over HTTP
"MTSI"	Multimedia Telephony Service for IMS
"VR"	Virtual Reality

### 5.6.3.22 Enumeration: AvailableRanVisibleQoeMetric

The enumeration AvailableRanVisibleQoeMetric indicates different available RAN-visible QoE metrics to the gNB. It shall comply with the provisions defined in Table 5.6.3.22-1.

**Table 5.6.3.22-1: Enumeration AvailableRanVisibleQoeMetric**

Enumeration value	Description
"APPLICATION_LAYER_BUFFER_LEVEL_LIST"	See 3GPP TS 28.405 [56], clause 5.12.
"PLAYOUT_DELAY_FOR_MEDIA_STARTUP"	See 3GPP TS 28.405 [56], clause 5.12.

### 5.6.3.23 Enumeration: MeasurementType

The enumeration MeasurementType defines Measurement Type in the 5GC UE level measurements trace. See 3GPP TS 32.422 [19] and 3GPP TS 28.558 [66] for further description of the values.

**Table 5.6.3.23-1: Enumeration MeasurementType**

Enumeration value	Description
"GTP_DELAYDLPSAUPFUEMEAN_SNSSAI_QFI"	GTP.DelayDIPsaUpfUeMean.SNSSAI.QFI.
"GTP_DELAYULPSAUPFUEMEANEXCD1_SNSSAI_QFI"	GTP.DelayUIPsaUpfUeMeanExcD1.SNSSAI.QFI.
"GTP_DELAYDLPSAUPFUEMEANINCD1_SNSSAI_QFI"	GTP.DelayDIPsaUpfUeMeanIncD1.SNSSAI.QFI.
"GTP_DELAYULPSAUPFNNGRANMEAN_SNSSAI_QFI"	GTP.DelayUIPsaUpfNgranMean.SNSSAI.QFI.
"GTP_DELAYDLPSAUPFNNGRANMEAN_SNSSAI_QFI"	GTP.DelayDIPsaUpfNgranMean.SNSSAI.QFI.
"GTP_RTTDELAYPSAUPFNNGRANMEAN"	GTP.RttDelayPsaUpfNgranMean.
"GTP_RTTDELAYPSAUPFNNGRANMEAN_SNSSAI"	GTP.RttDelayPsaUpfNgranMean_SNSSAI.
"GTP_RTTDELAYPSAUPFNNGRANMEAN_QFI"	GTP.RttDelayPsaUpfNgranMean_QFI.
"GTP_RTTDELAYPSAUPFNNGRANMEAN_SNSSAI_QFI"	GTP.RttDelayPsaUpfNgranMean_SNSSAI_QFI.

### 5.6.3.24 Enumeration: BluetoothRssi

The enumeration BluetoothRssi defines RSSI measurement by UE for Bluetooth. See 3GPP TS 38.413 [11] for further description of the values. It shall comply with the provisions defined in table 5.6.3.24-1.

**Table 5.6.3.24-1: Enumeration BluetoothRssi**

Enumeration value	Description
"TRUE"	RSSI measurement by UE for Bluetooth is required.

### 5.6.3.25 Enumeration: WlanRssi

The enumeration WlanRssi defines RSSI measurement by UE for WLAN. See 3GPP TS 38.413 [11] for further description of the values. It shall comply with the provisions defined in table 5.6.3.25-1.

**Table 5.6.3.25-1: Enumeration WlanRssi**

Enumeration value	Description
"TRUE"	RSSI measurement by UE for WLAN is required.

### 5.6.3.26 Enumeration: WlanRtt

The enumeration WlanRtt defines RTT measurement by UE for WLAN. See 3GPP TS 38.413 [11] for further description of the values. It shall comply with the provisions defined in table 5.6.3.26-1.

**Table 5.6.3.26-1: Enumeration WlanRtt**

Enumeration value	Description
"TRUE"	RTT measurement by UE for WLAN is required.

## 5.6.4 Structured Data Types

### 5.6.4.1 Type: TraceData

**Table 5.6.4.1-1: Definition of type TraceData**

Attribute name	Data type	P	Cardinality	Description
traceRef	string	M	1	Trace Reference (see 3GPP TS 32.422 [19]).  It shall be encoded as the concatenation of MCC, MNC and Trace ID as follows: <MCC><MNC>-<Trace ID>  The Trace ID shall be encoded as a 3 octet string in hexadecimal representation. Each character in the Trace ID string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the Trace ID shall appear first in the string, and the character representing the 4 least significant bit of the Trace ID shall appear last in the string.  Pattern: '[0-9]{3}[0-9]{2,3}-[A-Fa-f0-9]{6}\$'
traceDepth	TraceDepth	M	1	Trace Depth (see 3GPP TS 32.422 [19]).
neTypeList	string	M	1	List of NE Types (see 3GPP TS 32.422 [19]).  It shall be encoded as an octet string in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits shall appear first in the string, and the character representing the 4 least significant bit shall appear last in the string.  Octets shall be coded according to 3GPP TS 32.422 [19].  Pattern: '[A-Fa-f0-9]+\$'
eventList	string	M	1	Triggering events (see 3GPP TS 32.422 [19]).  It shall be encoded as an octet string in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits shall appear first in the string, and the character representing the 4 least significant bit shall appear last in the string.  Octets shall be coded according to 3GPP TS 32.422 [19].  Pattern: '[A-Fa-f0-9]+\$'
collectionEntityIpv4Addr	Ipv4Addr	C	0..1	IPv4 Address of the Trace Collection Entity (see 3GPP TS 32.422 [19]). At least one of the collectionEntityIpv4Addr or collectionEntityIpv6Addr attributes shall be present.
collectionEntityIpv6Addr	Ipv6Addr	C	0..1	IPv6 Address of the Trace Collection Entity (see 3GPP TS 32.422 [19]). At least one of the collectionEntityIpv4Addr or collectionEntityIpv6Addr attributes shall be present.
traceReportingConsumerUri	Uri	O	0..1	URI of the Trace Reporting Consumer if streaming based report is supported (see 3GPP TS 32.422 [19]). If both the IP Address of the Trace Collection Entity and URI of the Trace Reporting Consumer are present, the URI of the Trace Reporting Consumer shall take the higher precedence.

interfaceList	string	O	0..1	<p>List of Interfaces (see 3GPP TS 32.422 [19]).</p> <p>It shall be encoded as an octet string in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits shall appear first in the string, and the character representing the 4 least significant bit shall appear last in the string.</p> <p>Octets shall be coded according to 3GPP TS 32.422 [19].</p> <p>If this attribute is not present, all the interfaces applicable to the list of NE types indicated in the neTypeList attribute should be traced.</p> <p>Pattern: '[A-Fa-f0-9]+\$'</p>
jobType	JobType	C	0..1	<p>This IE shall be present if it is available.</p> <p>When present, the IE shall be set to the value "TRACE_ONLY".</p>

5.6.4.2 Type: MdtConfiguration

**Table 5.6.4.2-1: Definition of type MdtConfiguration**

Attribute name	Data type	P	Cardinality	Description
jobType	JobType	M	1	This IE shall indicate the Job type for MDT, see 3GPP TS 32.422 [19]. This IE shall be set to one of the following values: "IMMEDIATE_MDT_ONLY" "LOGGED_MDT_ONLY" "IMMEDIATE_MDT_AND_TRACE" "LOGGED_MBSFN_MDT" "IMMEDIATE_MDT_AND_5GC_UE_LEVEL_MEASUREMENTS" "TRACE_IMMEDIATE_MDT_AND_5GC_UE_LEVEL_MEASUREMENTS"
reportType	ReportTypeMdt	C	0..1	This IE shall be present for logged MDT. When present, this IE shall indicate the report type for logged MDT, see 3GPP TS 32.422 [19].
areaScope	AreaScope	O	0..1	When present, this IE shall contain the area in Cells or Tracking Areas where the MDT data collection shall take place, see 3GPP TS 32.422 [19].
measurementLteList	array(MeasurementLteForMdt)	C	1..N	This IE shall be present if the Job type is configured for Immediate MDT or combined Immediate MDT and Trace. When present, this IE shall contain a list of the measurements that shall be collected for LTE.
measurementNrList	array(MeasurementNrForMdt)	C	1..N	This IE shall be present if the Job type is configured for Immediate MDT, combined Immediate MDT and Trace, Immediate MDT and 5GC UE level measurements or Trace, Immediate MDT and 5GC UE level measurements. When present, this IE shall contain a list of the measurements that shall be collected for NR.
sensorMeasurementList	array(SensorMeasurement)	O	1..N	When present, this IE shall include a list of the sensor measurements to be collected for UE in NR if they are available.
sensorMeasurementLteList	array(SensorMeasurement)	O	1..N	When present, this IE shall include a list of the sensor measurements to be collected for UE in LTE if they are available.
reportingTriggerList	array(ReportingTrigger)	C	1..N	This IE shall be present if MeasurementList is configured for UE side measurements (such as M1 measurement in LTE) and the jobType is configured for Immediate MDT, combined Immediate MDT and Trace, Immediate MDT and 5GC UE level measurements or Trace, Immediate MDT and 5GC UE level measurements. When present, this IE shall contain a list of the reporting triggers. For LTE and NR, this IE shall not have the combination of periodical, event based and event based periodic reporting at the same time.
reportInterval	ReportIntervalMdt	C	0..1	This IE shall be present if the reportingTriggerList is configured for Periodic UE side measurements (such as M1 measurement in LTE) and the jobType is configured for Immediate MDT or combined Immediate MDT and Trace. When present, this IE shall indicate the interval between the periodical measurements to be taken when UE is in connected in LTE.
reportIntervalNr	ReportIntervalNrMdt	C	0..1	This IE shall be present if the reportingTriggerList is configured for Periodic UE side measurements (such as M1 measurement in NR) and the jobType is configured for Immediate MDT, combined Immediate MDT and Trace, Immediate MDT and 5GC UE level measurements or Trace, Immediate MDT and 5GC UE level measurements. When present, this IE shall indicate the interval between the periodical measurements to be taken when UE is in connected in NR.

reportAmount	ReportAmountMdt	C	0..1	This IE shall be present if the reportingTriggerList is configured for Periodic UE side measurements (such as M1 measurement in LTE) and the jobType is configured for Immediate MDT, combined Immediate MDT and Trace, Immediate MDT and 5GC UE level measurements or Trace, Immediate MDT and 5GC UE level measurements. When present, this IE shall indicate the overall number of measurement reports that shall be taken for periodical reporting while UE is in connected.
reportAmountPerMeasurementLte	map(ReportAmountMdt)	C	1..N	A map (list of key-value pairs where MeasurementLteForMdt serves as key; see clause 5.6.3.5) of ReportAmountMdt). May be present if reportAmount is present.  When present, this IE shall indicate the number of measurement reports per measurement that shall be taken for periodical reporting while UE is in connected in LTE.
reportAmountPerMeasurementNR	map(ReportAmountMdt)	C	1..N	A map (list of key-value pairs where MeasurementNrForMdt serves as key; see clause 5.6.3.6) of ReportAmountMdt). May be present if reportAmount is present.  When present, this IE shall indicate the number of measurement reports per measurement that shall be taken for periodical reporting while UE is in connected in NR.
eventThresholdRsrp	integer	C	0..1	This IE shall be present if the report trigger parameter is configured for A2 event reporting or A2 event triggered periodic reporting and the job type parameter is configured for Immediate MDT or combined Immediate MDT and Trace in LTE. When present, this IE shall indicate the Event Threshold for RSRP, and the value shall be between 0-97.
eventThresholdRsrpNr	integer	C	0..1	This IE shall be present if the report trigger parameter is configured for A2 event reporting or A2 event triggered periodic reporting and the job type parameter is configured for Immediate MDT, combined Immediate MDT and Trace, Immediate MDT and 5GC UE level measurements or Trace, Immediate MDT and 5GC UE level measurements in NR. When present, this IE shall indicate the Event Threshold for RSRP, and the value shall be between 0-127.
eventThresholdRsrq	integer	C	0..1	This IE shall be present if the report trigger parameter is configured for A2 event reporting or A2 event triggered periodic reporting and the job type parameter is configured for Immediate MDT or combined Immediate MDT and Trace in LTE. When present, this IE shall indicate the Event Threshold for RSRQ, and the value shall be between 0-34.
eventThresholdRsrqNr	integer	C	0..1	This IE shall be present if the report trigger parameter is configured for A2 event reporting or A2 event triggered periodic reporting and the job type parameter is configured for Immediate MDT, combined Immediate MDT and Trace, Immediate MDT and 5GC UE level measurements or Trace, Immediate MDT and 5GC UE level measurements in NR. When present, this IE shall indicate the Event Threshold for RSRQ, and the value shall be between 0-127.

eventList	array(EventForMdt)	C	1..N	This IE shall be present for event triggered measurement in the case of logged MDT. When present, this IE shall contain a list of events triggered measurement in NR.
loggingInterval	LoggingIntervalMdt	C	0..1	This IE shall be present if the job type is configured for Logged MDT or Logged MBSFN MDT in LTE. When present, this IE shall contain the periodicity for logging MDT measurement results for periodic downlink pilot strength measurement in LTE when UE is in Idle.
loggingIntervalNr	LoggingIntervalNrMdt	C	0..1	This IE shall be present if the job type is configured for Logged MDT or Logged MBSFN MDT in NR. When present, this IE shall contain the periodicity for logging MDT measurement results for periodic downlink pilot strength measurement in NR when UE is in Idle.
loggingDuration	LoggingDurationMdt	O	0..1	This IE shall be present if the job type parameter is configured for Logged MDT or Logged MBSFN MDT. When present, this IE shall indicate the validity time of MDT logged configuration for IDLE in LTE
loggingDurationNr	LoggingDurationNrMdt	O	0..1	This IE shall be present if the job type parameter is configured for Logged MDT or Logged MBSFN MDT. When present, this IE shall indicate the validity time of MDT logged configuration for IDLE in NR.
positioningMethod	PositioningMethodMdt	O	0..1	This IE may be present if the job type is set to Immediate MDT, Immediate MDT and Trace, Immediate MDT and 5GC UE level measurements or Trace, Immediate MDT and 5GC UE level measurements. When present, it shall indicate the positioning method that shall be used for the MDT job. For LTE the value "GNSS" may be selected only if the M1 measurement is selected in measurementList.
addPositioningMethodList	array(PositioningMethodMdt)	O	1..N	This IE may be present if positioningMethod is present.  When present, it shall indicate a list of the additional positioning methods that shall be used for the MDT job.  For LTE, the value "GNSS" may be selected only if the M1 measurement is selected in measurementList.
collectionPeriodRmmLte	CollectionPeriodRmmLteMdt	C	0..1	This IE shall be present if the job type is set to Immediate MDT or Immediate MDT and Trace and any of the "M2" or "M3" is contained in measurementList attribute in LTE. When present, it shall contain the collection period that should be used to collect available measurement samples in case of RRM configured measurements. The same collection period should be used for all such measurements that are requested in the same MDT or combined Trace and MDT job.

collectionPeriodRmmNr	CollectionPeriodRmmNrMdt	C	0..1	<p>This IE shall be present if the job type is set to Immediate MDT, Immediate MDT and Trace, Immediate MDT and 5GC UE level measurements or Trace, Immediate MDT and 5GC UE level measurements and any of the "M4" or "M5" is contained in measurementList attribute in NR.</p> <p>When present, it shall contain the collection period that should be used to collect available measurement samples in case of RRM configured measurements. The same collection period should be used for all such measurements that are requested in the same MDT or combined Trace and MDT job.</p>
measurementPeriodLte	MeasurementPeriodLteMdt	C	0..1	<p>This IE shall be present if the job type is set to Immediate MDT or Immediate MDT and Trace and either the value "M4_DL" or "M4_UL" or "M5_DL" or "M5_UL" is contained in measurementList attribute in LTE.</p> <p>When present, it shall contain the collection period that should be used for the Data Volume and Scheduled IP Throughput measurements made by the eNB. The same measurement period should be used for the UL and DL.</p>
mdtAllowedPlmnIdList	array(PlmnId)	O	1..N	<p>When present, this IE shall contain the PLMNs where measurement collection, status indication and log reporting is allowed. E.g. the UE performs these actions for Logged MDT when the RPLMN is part of this set of PLMNs.</p> <p>Maximum of 16 PLMNs can be contained.</p>
mbsfnAreaList	array(MbsfnArea)	O	1..N	<p>When present, this IE shall contain MBSFN Area(s) for MBSFN measurement logging.</p> <p>Maximum of 8 MBSFN area(s) can be contained.</p> <p>This parameter is applicable only if the job type is Logged MBSFN MDT and for eUTRAN only.</p>
interFreqTargetList	array(InterFreqTargetInfo)	O	1..8	<p>When present, this IE shall indicate Inter Frequency Target(s) for which the UE is requested to perform measurement logging.</p>
mnOnlyInd	boolean	O	0..1	<p>When present, this IE shall indicate whether the MDT Configuration is only applicable for the master node or not if the UE is configured with MR-DC.</p> <p>This IE shall be set as follows:</p> <ul style="list-style-type: none"> <li>- true: MDT Configuration is for master node only</li> <li>- false (default): MDT Configuration is for both master node and secondary node.</li> </ul>
eventThresholdSinrNr	integer	C	0..1	<p>This IE shall be present if the report trigger parameter is configured for A2 event reporting or A2 event triggered periodic reporting and the job type parameter is configured for Immediate MDT or combined Immediate MDT and Trace in NR.</p> <p>When present, this IE shall indicate the Event Threshold for SINR, and the value shall be between 0-127.</p>
bluetoothMeasurementNr	BluetoothMeasurement	O	0..1	<p>When present, this IE shall include the bluetooth measurements to be collected for UE in NR if they are available.</p>
bluetoothMeasurementLte	BluetoothMeasurement	O	0..1	<p>When present, this IE shall include the bluetooth measurements to be collected for UE in LTE if they are available.</p>
wlanMeasurementNr	WlanMeasurement	O	0..1	<p>When present, this IE shall include the WLAN Measurements to be collected for UE in NR if they are available.</p>
wlanMeasurementLte	WlanMeasurement	O	0..1	<p>When present, this IE shall include the WLAN Measurements to be collected for UE in LTE if they are available.</p>
sliceAreaScope	array(SliceScopePerPlmn)	O	1..16	<p>When present, this IE shall contain the list of network slices for MDT.</p>

## 5.6.4.3 Type: AreaScope

Table 5.6.4.3-1: Definition of type AreaScope

Attribute name	Data type	P	Cardinality	Description
eutraCellIdList	array(EutraCellId)	O	1..N	When present, this IE shall contain a list of the E-UTRAN Cell Identifications where the MDT data collection shall take place.
nrCellIdList	array(NrCellId)	O	1..N	When present, this IE shall contain a list of the NR Cell Identities where the MDT data collection shall take place.
tacList	array(Tac)	O	1..N	When present, this IE shall contain a list of the tracking area codes where the MDT data collection shall take place.
tacInfoPerPlmn	map(TacInfo)	O	1..N	A map (list of key-value pairs where PlmnId converted to string serves as key; see clause 5.4.4.3) of TacInfo
cagInfoPerPlmn	map(CagInfo)	O	1..N	A map (list of key-value pairs where PlmnId converted to string serves as key; see clause 5.4.4.3) of CagInfo
nidInfoPerPlmn	map(NidInfo)	O	1..N	A map (list of key-value pairs where PlmnId converted to string serves as key; see clause 5.4.4.3) of NidInfo
cellIdNidInfoPerPlmn	map(CellIdNidInfo)	O	1..N	A map (list of key-value pairs where PlmnId converted to string serves as key; see clause 5.4.4.3) of CellIdNidInfo
tacNidInfoPerPlmn	map(TacNidInfo)	O	1..N	A map (list of key-value pairs where PlmnId converted to string serves as key; see clause 5.4.4.3) of TacNidInfo
cagList	array(CagId)	O	1..N	When present, this IE shall contain a list of the CAG IDs where the MDT data collection shall take place.

## 5.6.4.4 Type: TacInfo

Table 5.6.4.4-1: Definition of type TacInfo

Attribute name	Data type	P	Cardinality	Description
tacList	array(Tac)	M	1..N	This IE shall contain a list of the tracking area codes.

## 5.6.4.5 Type: MbsfnArea

Table 5.6.4.5-1: Definition of type MbsfnArea

Attribute name	Data type	P	Cardinality	Description
mbsfnAreald	integer	O	0..1	This IE shall contain the MBSFN Area ID. The range of the value is from 0 to 255, see 3GPP TS 36.331 [39].
carrierFrequency	integer	O	0..1	When present, this IE shall contain the Carrier Frequency (EARFCN). The range of the value is from 0 to 262143, see 3GPP TS 36.331 [39].
NOTE	If both mbsfnAreald and carrierFrequency values are present, a specific MBSFN area is indicated. If carrierFrequency is present, but mbsfnAreald is absent, all MBSFN areas on that carrier frequency are indicated. If both mbsfnAreald and carrierFrequency are absent, any MBSFN area is indicated.			

## 5.6.4.6 Type: InterFreqTargetInfo

Table 5.6.4.6-1: Definition of type InterFreqTargetInfo

Attribute name	Data type	P	Cardinality	Description
dCarrierFreq	ArfcnValueNr	M	1	This IE shall indicate the value of frequency for download for measurement logging.
cellIdList	array(PhysCellId)	O	1..32	When present, this IE shall contain a list of the physical cell identities where the UE is requested to perform measurement logging for the indicated frequency.  If absent, the UE shall perform measurement logging on all physical cells.

## 5.6.4.7 Type: QmcConfigInfo

Table 5.6.4.7-1: Definition of type QmcConfigInfo

Attribute name	Data type	P	Cardinality	Description
qoeReference	QoeReference	M	1	This IE contains the Quality of Experience (QoE) Reference. See 3GPP TS 28.405 [56], clause 5.2.
serviceType	QoeServiceType	O	0..1	This IE contains the Service Type of QoE measurements. See 3GPP TS 28.405 [56], clause 5.8.
sliceScope	array(Snssai)	O	1..N	This IE contains a list of S-NSSAIs. See 3GPP TS 28.405 [56], clause 5.9.
areaScope	QmcAreaScope	O	0..1	This IE contains the area in Cells or Tracking Areas where the QMC data collection shall take place. See 3GPP TS 28.405 [56], clause 5.4.
qoeCollectionEntityAddress	IpAddr	O	0..1	This IE contains the IP address (IPv4 or IPv6) of the entity to which the QMC records shall be transferred. See 3GPP TS 28.405 [56], clause 5.1.
qoeTarget	QoeTarget	O	0..1	This parameter specifies the target object (individual UE) for the QMC in case of signalling based QMC. The qoeTarget parameter shall be able to carry an IMSI or a SUPI. See 3GPP TS 28.405 [56], clause 5.10.
mdtAlignmentInfo	MdtAlignmentInfo	O	0..1	This parameter indicates the MDT measurements with which alignment of QoE measurement is required. It contains the Trace Reference and Trace Recording Session Reference. See 3GPP TS 28.405 [56], clause 5.13.
availableRanVisibleQoeMetrics	array(AvailableRanVisibleQoeMetric)	O	1..N	A list of RAN-visible QoE metrics configured by gNB to collect all or some of the available RAN visible QoE metrics, where the indication of metric availability is indicated by UDM.
containerForAppLayerMeasConfig	Bytes	O	0..1	This parameter contains application layer measurement configuration. See 3GPP TS 28.405 [56], clause 5.5.
mbsCommunicationServiceType	MbsServiceType	O	0..1	This parameter indicates for which type of MBS communication service the QoE measurement configuration pertains to (i.e. "MULTICAST", "BROADCAST").

## 5.6.4.8 Type: QmcAreaScope

Table 5.6.4.8-1: Definition of type QmcAreaScope

Attribute name	Data type	P	Cardinality	Description
nrCellIdList	array(NrCellId)	O	1..N	When present, this IE shall contain a list of the NR Cell Identities where the QMC shall take place.
taclist	array(Tac)	O	1..N	When present, this IE shall contain a list of the tracking area codes where the QMC shall take place.
tailist	array(Tai)	O	1..N	When present, this IE shall contain a list of the TAIs where the QMC shall take place.
plmnList	array(Plmnlid)	O	1..N	When present, this IE shall contain a list of the PLMNs where the QMC shall take place.

## 5.6.4.9 Type: QoeTarget

Table 5.6.4.9-1: Definition of type QoeTarget

Attribute name	Data type	P	Cardinality	Description
supi	Supi	O	0..1	When present, this IE shall contain the SUPI of the target object (individual UE) for the QMC in case of signalling based QMC.
imsi	Imsi	O	0..1	When present, this IE shall contain the IMSI of the target object (individual UE) for the QMC in case of signalling based QMC.

## 5.6.4.10 Type: CagInfo

Table 5.6.4.10-1: Definition of type CagInfo

Attribute name	Data type	P	Cardinality	Description
cagList	array(CagId)	M	1..N	This IE shall contain a list of the CAG IDs.

## 5.6.4.11 Type: NidInfo

Table 5.6.4.11-1: Definition of type NidInfo

Attribute name	Data type	P	Cardinality	Description
nidList	array(Nid)	M	1..N	This IE shall contain a list of the NIDs.

## 5.6.4.12 Type: UeLevelMeasurementsConfiguration

Table 5.6.4.12-1: Definition of type UeLevelMeasurementsConfiguration

Attribute name	Data type	P	Cardinality	Description
jobType	JobType	M	1	This IE shall indicate the Job type for 5GC UE level measurements, see 3GPP TS 32.422 [19].  This IE shall be set to one of the following values: "5GC_UE_LEVEL_MEASUREMENTS_ONLY" "TRACE_AND_5GC_UE_LEVEL_MEASUREMENTS_ONLY" "IMMEDIATE_MDT_AND_5GC_UE_LEVEL_MEASUREMENTS" "TRACE_IMMEDIATE_MDT_AND_5GC_UE_LEVEL_MEASUREMENTS"
ueLevelMeasurementsList	array(MeasurementType)	M	1..N	List of 5GC UE level Measurement Type (see 3GPP TS 28.558 [66]).
granularityPeriod	DurationSec	O	0..1	This IE identifies the period time for every Trace Recording Session of 5GC UE level measurement (see 3GPP TS 32.422 [19]).

## 5.6.4.13 Type: CellIdNidInfo

Table 5.6.4.13-1: Definition of type CellIdNidInfo

Attribute name	Data type	P	Cardinality	Description
cellIdNidList	array(CellIdNid)	M	1..N	This IE shall contain a list of the NR Cell Identities in SNPN.

## 5.6.4.14 Type: CellIdNid

Table 5.6.4.14-1: Definition of type CellIdNid

Attribute name	Data type	P	Cardinality	Description
cellId	NrCellId	M	1	This IE shall contain the NR Cell Identity.
nid	Nid	M	1	This IE shall contain the Network Identity.

## 5.6.4.15 Type: TacNidInfo

Table 5.6.4.15-1: Definition of type TacNidInfo

Attribute name	Data type	P	Cardinality	Description
tacNidList	array(TacNid)	M	1..N	This IE shall contain a list of the tracking area codes in SNPN.

## 5.6.4.16 Type: TacNid

Table 5.6.4.16-1: Definition of type TacNid

Attribute name	Data type	P	Cardinality	Description
tac	Tac	M	1	This IE shall contain the tracking area code.
nid	Nid	M	1	This IE shall contain the Network Identity.

## 5.6.4.17 Type: BluetoothMeasurement

Table 5.6.4.17-1: Definition of type BluetoothMeasurement

Attribute name	Data type	P	Cardinality	Description
measurementNameList	array(MeasurementName)	C	1..4	This IE shall be present if available. When present, this IE shall contain the list of Bluetooth Measurement Configuration Name.
bluetoothRssi	BluetoothRssi	O	0..1	When present, this IE shall contain the RSSI measurement by UE for Bluetooth for M8 measurement.

## 5.6.4.18 Type: WlanMeasurement

Table 5.6.4.18-1: Definition of type WlanMeasurement

Attribute name	Data type	P	Cardinality	Description
measurementNameList	array(MeasurementName)	C	1..4	This IE shall be present if available. When present, this IE shall contain the list of WLAN Measurement Configuration Name.
wlanRssi	WlanRssi	O	0..1	When present, this IE shall contain the RSSI measurement by UE for WLAN for M8 measurement.
wlanRtt	WlanRtt	O	0..1	When present, this IE shall contain the RTT measurement by UE for WLAN for M9 measurement.

## 5.6.4.19 Type: MeasurementName

Table 5.6.4.19-1: Definition of type MeasurementName

Attribute name	Data type	P	Cardinality	Description
bluetoothName	string	C	0..1	This IE shall be present for Bluetooth Measurement Configuration. When present, this IE shall contain the Bluetooth local name used for Bluetooth measurement collection, see clause 9.3.1.177 of 3GPP TS 38.413 [11].
wlanName	string	C	0..1	This IE shall be present for WLAN Measurement Configuration. When present, this IE shall contain the WLAN SSID used for WLAN measurement collection, see clause 9.3.1.178 of 3GPP TS 38.413 [11].

## 5.6.4.20 Type: SliceScopePerPlmn

Table 5.6.4.20-1: Definition of type SliceScopePerPlmn

Attribute name	Data type	P	Cardinality	Description
plmn	PlmnId	M	1	This IE shall contain the PLMN where the MDT data collection shall take place.
sliceScope	array(Snssai)	M	1..1024	This IE shall contain a list of S-NSSAIs.

## 5.7 Data Types related to 5G Operator Determined Barring

### 5.7.1 Introduction

This clause defines common data types related to 5G Operator Determined Barring.

### 5.7.2 Simple Data Types

This clause specifies common simple data types.

**Table 5.7.2-1: Simple Data Types**

Type Name	Type Definition	Description

### 5.7.3 Enumerations

#### 5.7.3.1 Enumeration: RoamingOdb

The enumeration RoamingOdb defines the Barring of Roaming as. See 3GPP TS 23.015 [26] for further description. It shall comply with the provisions defined in table 5.7.3.1-1.

**Table 5.7.3.1-1: Enumeration RoamingOdb**

Enumeration value	Description
"OUTSIDE_HOME_PLMN"	Barring of roaming outside the home PLMN
"OUTSIDE_HOME_PLMN_COUNTRY"	Barring of roaming outside the home PLMN country

#### 5.7.3.2 Enumeration: OdbPacketServices

The enumeration OdbPacketServices defines the Barring of Packet Oriented Services. See 3GPP TS 23.015 [26] for further description. It shall comply with the provisions defined in table 5.7.3.2-1.

**Table 5.7.3.2-1: Enumeration OdbPacketServices**

Enumeration value	Description
"ALL_PACKET_SERVICES"	Barring of all Packet Oriented Services
"ROAMER_ACCESS_HPLMN_AP"	Barring of Packet Oriented Services from access points that are within the HPLMN whilst the subscriber is roaming in a VPLMN
"ROAMER_ACCESS_VPLMN_AP"	Barring of Packet Oriented Services from access points that are within the roamed to VPLMN.

### 5.7.4 Structured Data Types

#### 5.7.4.1 Type: OdbData

**Table 5.7.4.1-1: Definition of type OdbData**

Attribute name	Data type	P	Cardinality	Description
roamingOdb	RoamingOdb	O	0..1	Barring of Roaming (see 3GPP TS 23.015 [26]).

## 5.8 Data Types related to Charging

### 5.8.1 Introduction

This clause defines common data types related to Charging.

### 5.8.2 Simple Data Types

This clause specifies common simple data types.

**Table 5.8.2-1: Simple Data Types**

Type Name	Type Definition	Description
ChargingId	Uint32	Charging identifier allowing correlation of charging information (NOTE)
SmfChargingId	string	String based Charging ID as specified in 3GPP TS 32.255 [58].  The String based Charging ID shall include a Uint32 base charging identifier (decimal encoded value within the values range: 0 to 4294967295 included) as the first segment, which shall be unique within the SMF assigning the Charging ID.  The String based Charging ID shall include the NF Instance ID (UUID format) of the SMF that assigned the Charging ID, as the second segment.  Pattern: <code>^(0 ([1-9]{1}[0-9]{0,9}))\.smf-([0-9a-f]{8}-[0-9a-f]{4}-[0-9a-f]{4}-[0-9a-f]{4}-[0-9a-f]{12})\$</code>  Example:  Base Charging ID: "9387"  SMF NF Instance ID: "4947a69a-f61b-4bc1-b9da-47c9c5d14b64"  String based Charging ID: "9387.smf-4947a69a-f61b-4bc1-b9da-47c9c5d14b64"
ApplicationChargingId	string	Application provided charging identifier allowing correlation of charging information.
RatingGroup	Uint32	Identifier of a Rating Group
ServiceId	Uint32	Identifier of a Service
NOTE: This data type is deprecated and shall not be used by any new API definition. To ensure the uniqueness of the charging identifier, the SmfChargingId data type shall be used for new attributes defined in APIs carrying a charging identifier.		

### 5.8.3 Enumerations

### 5.8.4 Structured Data Types

#### 5.8.4.1 Type: SecondaryRatUsageReport

**Table 5.8.4.1-1: Definition of type SecondaryRatUsageReport**

Attribute name	Data type	P	Cardinality	Description
secondaryRatType	RatType	M	1	Secondary RAT type
qosFlowsUsageData	array(QosFlowUsageReport)	M	1..N	QoS flows usage data

## 5.8.4.2 Type: QoSFlowUsageReport

Table 5.8.4.2-1: Definition of type QoSFlowUsageReport

Attribute name	Data type	P	Cardinality	Description
qfi	Qfi	M	1	QoS Flow Indicator
startTimeStamp	DateTime	M	1	UTC time indicating the start time of the collection period of the included usage data for DL and UL.
endTimeStamp	DateTime	M	1	UTC time indicating the end time of the collection period of the included usage data for DL and UL.
downlinkVolume	Int64	M	1	Data usage for DL, encoding a number of octets
uplinkVolume	Int64	M	1	Data usage for UL, encoding a number of octets

## 5.8.4.3 Type: SecondaryRatUsageInfo

Table 5.8.4.3-1: Definition of type SecondaryRatUsageInfo

Attribute name	Data type	P	Cardinality	Description
secondaryRatType	RatType	M	1	Secondary RAT type
qosFlowsUsageData	array(QoSFlowUsageReport)	O	1..N	QoS flows usage data
pduSessionUsageData	array(VolumeTimedReport)	O	1..N	PDU session usage data

## 5.8.4.4 Type: VolumeTimedReport

Table 5.8.4.4-1: Definition of type VolumeTimedReport

Attribute name	Data type	P	Cardinality	Description
startTimeStamp	DateTime	M	1	UTC time indicating the start time of the collection period of the included usage data for DL and UL.
endTimeStamp	DateTime	M	1	UTC time indicating the end time of the collection period of the included usage data for DL and UL.
downlinkVolume	Int64	M	1	Data usage for DL, encoding a number of octets
uplinkVolume	Int64	M	1	Data usage for UL, encoding a number of octets

## 5.9 Data Types related to MBS

## 5.9.1 Introduction

This clause defines common data types related to MBS.

## 5.9.2 Simple Data Types

This clause specifies common simple data types.

Table 5.9.2-1: Simple Data Types

Type Name	Type Definition	Description
AreaSessionId	Uint16	Area Session Identifier used for MBS session with location dependent content. When present, the Area Session ID together with the TMGI uniquely identifies the MBS session in a specific MBS service area.
AreaSessionPolicyId	Uint16	Area Session Policy ID used for MBS session with location dependent content.
MbsFsald	string	MBS Frequency Selection Area ID, for a broadcast MBS session  The value of the MbsFsald shall be encoded in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the MBS FSA Id shall appear first in the string, and the character representing the 4 least significant bit of the MBS FSA Id shall appear last in the string.  Pattern: '[A-Fa-f0-9]{6}\$'
IntendedServiceArea	Bytes	String with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters, encoding the value of the Intended Service Area IE defined in clause 9.3.1.x of 3GPP TS 38.413 [11].

Editor's note: the encoding of the IntendedServiceArea needs to be confirmed/aligned on TS 38.413.

## 5.9.3 Enumerations

### 5.9.3.1 Enumeration: MbsServiceType

The enumeration MbsServiceType indicates the type of MBS session. It shall comply with the provisions defined in Table 5.9.3.1-1.

Table 5.9.3.1-1: Enumeration MbsServiceType

Enumeration value	Description	Applicability
"MULTICAST"	Multicast MBS session	
"BROADCAST"	Broadcast MBS session	

### 5.9.3.2 Enumeration: MbsSessionActivityStatus

The enumeration MbsSessionActivityStatus indicates the MBS session's activity status. It shall comply with the provisions defined in Table 5.9.3.2-1.

Table 5.9.3.2-1: Enumeration MbsSessionActivityStatus

Enumeration value	Description	Applicability
"ACTIVE"	Active MBS session	
"INACTIVE"	Inactive MBS session	

## 5.9.3.3 Enumeration: MbsSessionEventType

Table 5.9.3.3-1: Enumeration MbsSessionEventType

Enumeration value	Description	Applicability
"MBS_REL_TMGI_EXPIRY"	Subscription to be notified or notification request about the MBS session release due to TMGI expiry.	
"BROADCAST_DELIVERY_STATUS"	Subscription to be notified or notification request about the MBS session broadcast delivery status.	
"INGRESS_TUNNEL_ADD_CHANGE"	Subscription to be notified or notification request about change of the Ingress Tunnel Address, when using unicast transport over N6mb/Nmb9.	

## 5.9.3.4 Enumeration: BroadcastDeliveryStatus

Table 5.9.3.4-1: Enumeration BroadcastDeliveryStatus

Enumeration value	Description	Applicability
"STARTED"	The MBS session has been started.	
"TERMINATED"	The MBS session has been terminated.	

## 5.9.3.5 Enumeration: NrRedCapUeInfo

The enumeration NrRedCapUeInfo indicates NR RedCap Information of the broadcast MBS session. It shall comply with the provisions defined in Table 5.9.3.5-1.

Table 5.9.3.5-1: Enumeration NrRedCapUeInfo

Enumeration value	Description	Applicability
"NR_REDCAP_UE_ONLY"	Indicates that the MBS session is expected to be received only by NR (e)RedCap UEs.	
"BOTH_NR_REDCAP_UE_AND_NON_REDCAP_UE"	Indicates that the MBS session is expected to be received by any kind of UEs.	
"NON_REDCAP_UE_ONLY"	Indicates that the MBS session is expected to be received only by non-RedCap UEs, i.e. UEs that are neither NR RedCap UEs nor NR eRedCap UEs.	

## 5.9.4 Structured Data Types

## 5.9.4.1 Type: MbsSessionId

Table 5.9.4.1-1: Definition of type MbsSessionId

Attribute name	Data type	P	Cardinality	Description
tmgi	Tmgi	C	0..1	TMGI identifying the MBS session (NOTE)
ssm	Ssm	C	0..1	Source specific IP multicast address identifying the MBS session (NOTE)
nid	Nid	O	0..1	Network Identity used together with the TMGI to identify an MBS session in an SNPN

NOTE: At least one of the tmgi IE and ssm IE shall be present.

## 5.9.4.2 Type: Tmgi

Table 5.9.4.2-1: Definition of type Tmgi

Attribute name	Data type	P	Cardinality	Description
mbsServiceId	string	M	1	MBS Service ID consisting of a 6-digit fixed-length hexadecimal number between 000000 and FFFFFFFF.  Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the MBS Service ID shall appear first in the string, and the character representing the 4 least significant bit of the MBS Service ID shall appear last in the string.  Pattern: '[A-Fa-f0-9]{6}\$'
plmnId	PlmnId	M	1	PLMN ID

## 5.9.4.3 Type: Ssm

Table 5.9.4.3-1: Definition of type Ssm

Attribute name	Data type	P	Cardinality	Description
sourceIpAddr	IpAddr	M	1	IP unicast address used as source address in IP packets for identifying the source of the multicast service (e.g. AF/AS).
destIpAddr	IpAddr	M	1	IP multicast address used as destination address in related IP packets for identifying the multicast service associated with the source.

## 5.9.4.4 Type: MbsServiceArea

Table 5.9.4.4-1: Definition of type MbsServiceArea

Attribute name	Data type	P	Cardinality	Description
ncgiList	array(NcgiTai)	C	1..N	List of NR cell ids with their pertaining TAIs (NOTE 1, NOTE 3).
taiList	array(Tai)	C	1..N	List of tracking area Ids (NOTE 1).
intendedServAreaList	array(IntendedServiceArea)	O	1..N	List of NR NTN Intended Service Areas (NOTE 2)
NOTE 1: The MBS Service Area consists of the union of the cells in the tracking areas listed in the taiList IE and the cells listed in the ncgiList IE. At least one of the ncgiList IE and taiList IE shall be present.				
NOTE 2: The NR NTN Intended Service Area may be sent by the NEF/MBSF to the NG-RAN, via the MB-SMF and AMF, to further restrict the MBS service area. It contains information that shall only be used by the NG-RAN, i.e. the MB-SMF and AMF shall transfer this information transparently. See 3GPP TS 23.247 [72].				
NOTE 3: In case of NR NTN, the cell IDs contained in the MBS service area may correspond to mapped cell IDs as defined in 3GPP TS 38.300 [73].				

## 5.9.4.5 Type: NcgiTai

Table 5.9.4.5-1: Definition of type NcgiTai

Attribute name	Data type	P	Cardinality	Description
tai	Tai	M	1	TAI of the cells in cellList (NOTE)
cellList	array(Ncgi)	M	1..N	List of NR cell ids
NOTE:	The NcgiTai consists of the list of cells listed in the cellList IE. These cells pertain to the TAI indicated in the tai IE. The TAI may be used e.g. to discover and select an AMF that serves NG-RAN nodes supporting the corresponding cells.			

5.9.4.6 Type: MbsSession

**Table 5.9.4.6-1: Definition of type MbsSession**

Attribute name	Data type	P	Cardinality	Description
mbsSessionId	MbsSessionId	C	0..1	MBS session identifier (TMGI and/or SSM, and NID for an SNPN) (NOTE 1)
tmgiAllocReq	boolean	C	0..1	TMGI allocation request indication. This IE shall be present if the mbsSessionId IE is absent. This IE may also be present if the mbsSessionId IE is present and it does not contain a TMGI. When present, it shall be set as follows: - true: a TMGI is requested to be allocated  - false (default): no TMGI is requested to be allocated  Write-Only: true (NOTE 1)
tmgi	Tmgi	C	0..1	This IE shall be present in an MBS session creation response if the tmgiAllocReq IE was present and set to "true" in the MBS session creation request. When present, it shall indicate the TMGI allocated to the MBS session. Read-Only: true
expirationTime	DateTime	C	0..1	This IE shall be present in an MBS session creation response if the tmgiAllocReq IE was present and set to "true" in the in the MBS session creation request. When present, it shall indicate the expiration time for the TMGI allocated to the MBS session. Read-Only: true
serviceType	MbsServiceType	M	1	MBS Service Type (either multicast or broadcast service) Write-Only: true
locationDependent	boolean	C	0..1	Location dependent MBS session indication. This IE shall be present and set to true for a Location dependent MBS session. It may be present otherwise.  When present, it shall be set as follows: - true: this is a Location dependent MBS session  - false (default): this is not a Location dependent MBS session
areaSessionId	AreaSessionId	C	0..1	This IE shall be present in a successful response to a request to create an instance of a Location dependent MBS session i.e. when the "locationDependent" attribute is present and set to "true" in the MBS session creation request. When present, it shall contain the Area Session ID assigned by the MB-SMF to the location dependent MBS session instance in the MBS Service Area.  Read-Only: true
ingressTunAddrReq	boolean	O	0..1	Ingress transport address request indication (for unicast transport over N6mb/Nmb9). When present, it shall be set as follows: - true: an ingress transport address is requested  - false (default): no request  Write-Only: true

ingressTunAddr	array(TunnelAddress)	C	1..N	<p>Ingress tunnel address (UDP/IP tunnel).</p> <p>This IE shall be present in an MBS session creation response if the ingressTunAddrReq IE was present and set to "true" in the corresponding MBS session creation request.</p> <p>When present, it shall indicate the allocated ingress tunnel address(es).</p> <p>Read-Only: true (NOTE 2)</p>
ssm	Ssm	C	0..1	<p>Source specific IP multicast address</p> <p>This IE shall be present if multicast transport applies over N6mb and the MBS session is not identified by the SSM, e.g. for a location-dependent MBS session with multicast transport over N6mb.</p> <p>Write-Only: true</p>
mbsServiceArea	MbsServiceArea	O	0..1	<p>Contains the MBS Service Area</p> <p>This attribute shall be present only for a location dependent MBS session or a local MBS session.</p> <p>Write-Only: true</p>
extMbsServiceArea	ExternalMbsServiceArea	O	0..1	<p>Contains the MBS service area.</p> <p>This attribute shall be present only for a location dependent MBS session or a local MBS session.</p> <p>This IE may be present only over the N33 interface; it shall not be present over other interfaces.</p> <p>When present, it shall indicate the MBS Service Area information which shall either be geographical area information or civic address information.</p> <p>Write-Only: true</p>
redMbsServArea	MbsServiceArea	C	0..1	<p>This attribute shall be present if the requested MBS service area is not entirely contained within the service area of a single MB-SMF.</p> <p>When present, it shall contain the reduced MBS Service Area in which the MBS session has been created.</p> <p>Read-Only: true (NOTE 3)</p>
extRedMbsServArea	ExternalMbsServiceArea	C	0..1	<p>This attribute shall be present if the requested MBS service area is not entirely contained within the service area of a single MB-SMF. This IE may be present only over the N33 interface; it shall not be present over other interfaces.</p> <p>When present, it shall contain the reduced MBS Service Area in which the MBS session has been created, which shall either be geographical area information or civic address information.</p> <p>Read-Only: true (NOTE 3)</p>
dnn	Dnn	O	0..1	<p>Represents the DNN</p> <p>Write-Only: true</p>
snssai	Snssai	O	0..1	<p>Represents the S-NSSAI</p> <p>Write-Only: true</p>
activationTime	DateTime	O	0..1	<p>Represents the MBS session start time.</p> <p>This attribute is deprecated and replaced by the "startTime" attribute.</p>
startTime	DateTime	O	0..1	<p>Represents the MBS session start time.</p>

terminationTime	DateTime	O	0..1	Represents the MBS session termination time.
mbsServInfo	MbsServiceInfo	O	0..1	Contains the MBS Service Information for the MBS session.
mbsSessionSubsc	MbsSessionSubscription	O	0..1	Contains the parameters to request the creation of a subscription to one or more MBS session status event(s).
activityStatus	MbsSessionActivityStatus	O	0..1	Contains the session activity status (active or inactive). This IE may be provided if the "serviceType" attribute indicates a multicast MBS session.
anyUeInd	boolean	O	0..1	Indication that any UE may join the MBS session. This IE may be provided if the "serviceType" attribute indicates a multicast MBS session. When present, it shall be set as follows: - true: any UE may join the MBS session  - false (default): the MBS session is not open to any UE  Write-Only: true
mbsFsaldList	array(MbsFsald)	O	1..N	List of MBS Frequency Selection Area Identifiers, for a broadcast MBS session.  This attribute may be present if the "serviceType" attribute indicates a broadcast MBS session.
associatedSessionId	AssociatedSessionId	O	0..1	Associated Session ID to enable NG-RAN to identify the multiple MBS sessions delivering the same content when AF creates multiple broadcast MBS Sessions via different Core Networks to deliver the same content.
nrRedCapUeInfo	NrRedCapUeInfo	O	0..1	Indicates whether the broadcast MBS session is intended only for NR (e)RedCap UEs, only for UEs that are neither NR RedCap UEs nor NR eRedCap UEs, or for any kind of UE.
<p>NOTE 1: At least one of the mbsSessionId IE and tmgiAllocReq IE shall be present. Both may be present if the mbsSessionId IE does not contain a TMGI (i.e. if it only contains a SSM).</p> <p>NOTE 2: In a scenario where an MB-UPF covers a small service area (i.e. a list of TAIs that is a subset of the MBS service area), the MB-SMF needs to find other MB-UPF(s) to cover the whole MBS service area for the MBS session. In such scenarios, multiple ingress addresses of all MB-UPFs need to be allocated for an MBS session. These multiple ingress tunnel addresses are used to receive the same copy of the MBS session data from the AF/MBSTF. In such scenarios, the MBS service area served by an MB-UPF shall be larger than the MBS service area served by an AMF (set), i.e. an AMF in an AMF set shall receive only one MBS Session Information Request Transfer for an MBS session in the MBS Session Context Create/Update Request message.</p> <p>NOTE 3: These attributes are sent on different interfaces. Accordingly, they are mutually exclusive.</p>				

## 5.9.4.7 Type: MbsSessionSubscription

Table 5.9.4.7-1: Definition of type MbsSessionSubscription

Attribute name	Data type	P	Cardinality	Description
mbsSessionId	MbsSessionId	C	0..1	Identifier of the MBS Session for which the subscription is created. This IE shall be present, except for an MBS session subscription request that is sent within an MBS session creation request.
areaSessionId	AreaSessionId	C	0..1	Area Session ID, for a location dependent MBS session, identifying the part of the MBS session in an MBS service area for which the subscription is created. It shall be present for a location dependent MBS session, except for an MBS session subscription request that is sent within an MBS session creation request
eventList	array(MbsSessionEvent)	M	1..N	List of MBS session events subscribed
notifyUri	Uri	M	1	URI where the NF service consumer requests to receive MBS session notifications. Write-Only: true
notifyCorrelationId	string	O	0..1	Notification Correlation ID Write-Only: true
expiryTime	DateTime	O	0..1	When present in an MBS Session subscription creation request, it shall indicate the time up to which the subscription is desired to be kept active and after which the subscribed events shall stop generating notifications.  When present in a subscription response, it shall indicate the expiry time after which the subscription becomes invalid.
nfInstanceId	NfInstanceId	C	0..1	NF Instance ID of the NF Service Consumer This IE shall be present if available. Write-Only: true
mbsSessionSubscUri	Uri	C	0..1	This IE shall be present in the response to an MBS session creation request that includes a subscription to events about the MBS session and the subscription was created successfully. When present, it shall contain the URI of the individual subscription resource.  Read-Only: true (NOTE)
NOTE:	When an MBS session status subscription is created separately (i.e. after) an MBS session creation, the Location header returned in the MBS session status subscription creation response contains the URI of the created subscription.			

## 5.9.4.8 Type: MbsSessionEventReportList

Table 5.9.4.8-1: Definition of type MbsSessionEventReportList

Attribute name	Data type	P	Cardinality	Description
eventReportList	array(MbsSessionEventReport)	M	1..N	List of MBS session events to report
notifyCorrelationId	string	C	0..1	Notification Correlation ID. This IE shall be present if a Notification Correlation ID is available in the subscription.

## 5.9.4.9 Type: MbsSessionEvent

Table 5.9.4.9-1: Definition of type MbsSessionEvent

Attribute name	Data type	P	Cardinality	Description	Applicability
eventType	MbsSessionEventT ype	M	1	MBS session event type	

## 5.9.4.10 Type: MbsSessionEventReport

Table 5.9.4.10-1: Definition of type MbsSessionEventReport

Attribute name	Data type	P	Cardinality	Description	Applicability
eventType	MbsSessionEventT ype	M	1	MBS session event type	
timeStamp	DateTime	C	0..1	This IE shall contain the time at which the event is generated. This IE should be present, if available.	
ingressTunAddrInfo	IngressTunAddrInfo	C	0..1	This IE shall be present if the eventType IE indicates "INGRESS_TUNNEL_ADD_CHANGE".	
broadcastDelStatus	BroadcastDeliveryS tatus	C	0..1	This IE shall be present if the eventType IE indicates "BROADCAST_DELIVERY_STATUS".	

## 5.9.4.11 Type: ExternalMbsServiceArea

Table 5.9.4.11-1: Definition of type ExternalMbsServiceArea

Attribute name	Data type	P	Cardinality	Description
geographicAreaList	array(Geographic Area)	C	1..N	Identifies a list of geographic area specified by different shapes.
civicAddressList	array(CivicAddre ss)	C	1..N	Identifies a list of civic address.
NOTE: Either the geographicAreaList IE or the civicAddressList IE shall be present.				

## 5.9.4.12 Type: MbsSecurityContext

Table 5.9.4.12-1: Definition of type MbsSecurityContext

Attribute name	Data type	P	Cardinality	Description
keyList	map(MbsKeyInfo)	M	1..N	One or more MSK/MTK(s) and associated IDs. The key of the map shall be a (unique) valid JSON string per clause 7 of IETF RFC 8259 [78], with a maximum of 32 characters

## 5.9.4.13 Type: MbsKeyInfo

Table 5.9.4.13-1: Definition of type MbsKeyInfo

Attribute name	Data type	P	Cardinality	Description
keyDomainId	Bytes	M	1	Key Domain ID = MCC    MNC as defined in 3GPP TS 33.246 [45]. (NOTE)  It shall be encoded as a string with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters, representing the Key Domain ID (encoded in 3 bytes).
mskID	Bytes	M	1	MSK ID as defined in 3GPP TS 33.246 [45].  It shall be encoded as a string with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters, representing the MSK ID (encoded in 4 bytes).
msk	Bytes	C	0..1	MSK as defined in 3GPP TS 33.246 [45].  The IE shall not be present when MBSTF requests updated MSK from MBSF after, e.g. lifetime expiry. Shall be present otherwise.  When present, it shall be encoded as a string with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters, representing the MSK (encoded in 16 bytes).
mskLifetime	DateTime	O	0..1	MSK Lifetime as defined in 3GPP TS 33.501 [46].
mtkID	Bytes	C	0..1	MTK ID as defined in 3GPP TS 33.246 [45]. Shall be present if available.  It shall be encoded as a string with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters, representing the MTK ID (encoded in 2 bytes).
mtk	Bytes	C	0..1	MTK as defined in 3GPP TS 33.246 [45]. Shall be present if available.  It shall be encoded as a string with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters, representing the MTK (encoded in 16 bytes).
NOTE: For a multicast MBS session in a SNPN, the Key Domain ID for the MBS session should be encoded using MCC and MNC, in this case, it may not be unique.				

## 5.9.4.14 Type: IngressTunAddrInfo

Table 5.9.4.14-1: Definition of type IngressTunAddrInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
ingressTunAddr	array(TunnelAddresses)	M	1..N	Ingress Tunnel Address(es) to use to send MBS session data over N6mb/Nmb9 and that replace any earlier provided Ingress Tunnel Address(es).	

## 5.9.4.15 Type: MbsServiceAreaInfo

Table 5.9.4.15-1: Definition of type MbsServiceAreaInfo

Attribute name	Data type	P	Cardinality	Description
areaSessionId	AreaSessionId	M	1	Area Session Identifier used for MBS session with location dependent content.
mbsServiceArea	MbsServiceArea	M	1	MBS Service Area for MBS session with location dependent content.

## 5.9.4.16 Type: MbsServiceInfo

Table 5.9.4.16-1: Definition of type MbsServiceInfo

Attribute name	Data type	P	Cardinality	Description
mbsMediaComps	map(MbsMediaCompRm)	M	1..N	Contains the information of one or several media component(s). The key of the map is the "mbsMedCompNum" attribute of the corresponding MbsMediaCompRm data structure provided as a map entry.
mbsSdfResPrio	ReservPriority	O	0..1	Indicates the reservation priority of the MBS service data flow(s) identified by the "mbsMediaComps" attribute.
afAppId	AfAppId	O	0..1	Contains the AF application identifier.
mbsSessionAmbr	BitRate	O	0..1	Contains the required MBS Session-AMBR.

## 5.9.4.17 Type: MbsMediaComp

Table 5.9.4.17-1: Definition of type MbsMediaComp

Attribute name	Data type	P	Cardinality	Description	Applicability
mbsMedCompNum	integer	M	1	Contains the ordinal number of the MBS media component.	
mbsFlowDescs	array(FlowDescription)	O	1..N	Contains the flow description for the MBS Downlink IP flow(s).	
mbsSdfResPrio	ReservPriority	O	0..1	Indicates the reservation priority for the MBS service data flow(s) identified by the "mbsFlowDescs" attribute. (NOTE 2)	
mbsMediaInfo	MbsMediaInfo	O	0..1	Indicates the MBS media information. (NOTE 1)	
qosRef	string	O	0..1	Contains the identifier to pre-defined MBS QoS. (NOTE 1)	
mbsQoSReq	MbsQoSReq	O	0..1	Contains the MBS QoS requirements. (NOTE 1)	
NOTE 1: Only one of these attributes may be present.					
NOTE 2: When present, the value of this attribute shall apply for the MBS service data flow(s) identified by this MBS Media Component. It shall take precedence over the value of the same attribute within the parent MbsServiceInfo data structure.					

## 5.9.4.18 Type: MbsMediaCompRm

This data type is defined in the same way as the MbsMediaComp data type defined in clause 5.9.4.17, but with the OpenAPI "nullable: true" property.

5.9.4.19 Type: MbsQoSReq

**Table 5.9.4.19-1: Definition of type MbsQoSReq**

Attribute name	Data type	P	Cardinality	Description	Applicability
5qi	5Qi	M	1	Represents the required 5QI.	
guarBitRate	BitRate	O	0..1	Contain the required 5GS guaranteed bit rate.	
maxBitRate	BitRate	O	0..1	Contain the required 5GS maximum bit rate.	
averWindow	AverWindow	C	0..1	Indicates the averaging window.  This attribute shall be present only for a GBR QoS flow or a Delay Critical GBR QoS flow.	
reqMbsArp	Arp	O	0..1	Indicates the requested allocation and retention priority.	

5.9.4.20 Type: MbsMediaInfo

**Table 5.9.4.20-1: Definition of type MbsMediaInfo**

Attribute name	Data type	P	Cardinality	Description	Applicability
mbsMedType	MediaType	O	0..1	Indicates the MBS media type.	
maxReqMbsBwDI	BitRate	O	0..1	Contains the Maximum requested bandwidth.	
minReqMbsBwDI	BitRate	O	0..1	Contains the Minimum requested bandwidth.	
codecs	array(CodecData)	O	1..2	Indicates the codec data.	

5.9.4.21 Data types describing alternative data types or combinations of data types

5.9.4.21.1 Type: AssociatedSessionId

**5.9.6.21.1-1: Definition of type AssociatedSessionId as a list of non-exclusive alternative data types**

Data type	Cardinality	Description
Ssm	1	AssociatedSessionId encoded as an SSM.
string	1	AssociatedSessionId encoded as a string.

## 5.10 Data Types related to Time Synchronization

### 5.10.1 Introduction

This clause defines common data types related to Time Synchronization.

### 5.10.2 Simple Data Types

This clause specifies common simple data types.

**Table 5.10.2-1: Simple Data Types**

Type Name	Type Definition	Description
n/a		

## 5.10.3 Enumerations

### 5.10.3.1 Enumeration: SynchronizationState

**Table 5.10.3.1-1: Enumeration SynchronizationState**

Enumeration value	Description
"LOCKED"	Locked, see 3GPP TS 23.501 [2]
"HOLDOVER"	Holdover, see 3GPP TS 23.501 [2]
"FREERUN"	Freerun, see 3GPP TS 23.501 [2]

### 5.10.3.2 Enumeration: TimeSource

**Table 5.10.3.2-1: Enumeration TimeSource**

Enumeration value	Description
"SYNC_E"	SyncE, see 3GPP TS 23.501 [2]
"PTP"	PTP, see 3GPP TS 23.501 [2]
"GNSS"	GNSS, see 3GPP TS 23.501 [2]
"ATOMIC_CLOCK"	atomic clock, see 3GPP TS 23.501 [2]
"TERRESTRIAL_RADIO"	terrestrial radio, see 3GPP TS 23.501 [2]
"SERIAL_TIME_CODE"	serial time code, see 3GPP TS 23.501 [2]
"NTP"	NTP, see 3GPP TS 23.501 [2]
"HAND_SET"	hand_set, see 3GPP TS 23.501 [2]
"OTHER"	other, see 3GPP TS 23.501 [2]

### 5.10.3.3 Enumeration: ClockQualityDetailLevel

**Table 5.10.3.3-1: Enumeration ClockQualityDetailLevel**

Enumeration value	Description
"CLOCK_QUALITY_METRICS"	Clock Quality Metrics are to be provided to the UE
"ACCEPT_INDICATION"	Acceptable/not acceptable indication is to be provided to the UE

### 5.10.3.4 Enumeration: ClockQualityDetailLevelRm

This enumeration is defined in the same way as the "ClockQualityDetailLevel" enumeration, but with the OpenAPI "nullable: true" property.

## 5.10.4 Structured Data Types

### 5.10.4.1 Type: ClockQualityAcceptanceCriterion

**Table 5.10.4.1-1: Definition of type ClockQualityAcceptanceCriterion**

Attribute name	Data type	P	Cardinality	Description
synchronizationState	array(SynchronizationState)	O	1..N	Indicates the state of the node synchronization, represented by the values "LOCKED", "HOLDOVER", or "FREERUN"
clockQuality	ClockQuality	O	0..1	Clock Quality
parentTimeSource	array(TimeSource)	O	1..N	Parent Time Source.

### 5.10.4.1A Type: ClockQualityAcceptanceCriterionRm

Describes the modifications to the "ClockQualityAcceptanceCriterion" data type. This data type is defined in the same way as the "ClockQualityAcceptanceCriterion" data type, but:

- with the OpenAPI "nullable: true" property;
- the removable attributes "clockQuality" with the removable data types "ClockQualityRm"
- the removable attributes "synchronizationState" and "parentTimeSource" with the OpenAPI "nullable: true" property.

**Table 5.10.4.1A-1: Definition of type ClockQualityAcceptanceCriterionRm**

Attribute name	Data type	P	Cardinality	Description
synchronizationState	array(SynchronizationState)	O	1..N	Indicates the state of the node synchronization, represented by the values "LOCKED", "HOLDOVER", or "FREERUN" (NOTE)
clockQuality	ClockQualityRm	O	0..1	Clock Quality
parentTimeSource	array(TimeSource)	O	1..N	Parent Time Source (NOTE)

NOTE: The attribute may be removed and need to be defined as nullable:true in the openAPI file.

### 5.10.4.2 Type: ClockQuality

**Table 5.10.4.2-1: Definition of type ClockQuality**

Attribute name	Data type	P	Cardinality	Description
traceabilityToGnss	boolean	O	0..1	true indicates yes false indicates no
traceabilityToUtc	boolean	O	0..1	true indicates yes false indicates no
frequencyStability	Uint16	O	0..1	see 3GPP TS 23.501 [2]
clockAccuracyIndex	string	O	0..1	string of two hexadecimal digits; see table 5 of IEEE Std 1588 [51].
clockAccuracyValue	integer	O	0..1	Indicates the absolute clock accuracy value. Unit in 25ns. Min: 1 Max: 4000000

### 5.10.4.2A Type: ClockQualityRm

Describes the modifications to the "ClockQuality" data type. This data type is defined in the same way as the "ClockQuality" data type, but:

- with the OpenAPI "nullable: true" property;
- the removable attribute "frequencyStability" with the removable data types "Uint16Rm"
- the removable attributes "clockAccuracyValue" and "clockAccuracyIndex" with the OpenAPI "nullable: true" property.

**Table 5.10.4.2A-1: Definition of type ClockQualityRm**

Attribute name	Data type	P	Cardinality	Description
traceabilityToGnss	boolean	O	0..1	true indicates yes false indicates no
traceabilityToUtc	boolean	O	0..1	true indicates yes false indicates no
frequencyStability	Uint16Rm	O	0..1	see 3GPP TS 23.501 [2]
clockAccuracyIndex	string	O	0..1	string of two hexadecimal digits; see table 5 of IEEE Std 1588 [51]. (NOTE)
clockAccuracyValue	integer	O	0..1	Indicates the absolute clock accuracy value. Unit in 25ns. Min: 1 Max: 40000000 (NOTE)
NOTE: The attribute may be removed and need to be defined as nullable:true in the openAPI file.				

## 5.11 Data Types related to IMS SBA

### 5.11.1 Introduction

This clause defines common data types related to IMS SBA.

### 5.11.2 Simple Data Types

This clause specifies common simple data types.

Table 5.11.2-1: Simple Data Types

Type Name	Type Definition	Description
Fingerprint	string	Represents the certificate fingerprint for the DTLS association. The fingerprint is formatted as the pattern defined in IETF RFC 8122 [53].  Pattern: <code>^(SHA-1 SHA-224 SHA-256 SHA-384 SHA-512 MD5 MD2)s[0-9A-F]{2}(:[0-9A-F]{2})+&amp;#36;</code>  For example: 'SHA-1 4A:AD:B9:B1:3F:82:18:3B:54:02:12:DF:3E:5D:49:6B:19:E5:7C:A B'
MediaId	string	Media ID uniquely identifies one media flow within an IMS session.
MaxMessageSize	integer	The attribute can be associated with an "m=" line to indicate the maximum SCTP user message size (indicated in bytes) that an SCTP endpoint is willing to receive on the SCTP association associated with the "m=" line. Different attribute values can be used in each direction.  The MaxMessageSize is specified in IETF RFC 8841 [55].
SessionId	string	Session ID is used for IMS session identification. When present, the Session ID uniquely identifies the IMS session in a specific IMS service area. This IE contains the information in the Call-ID header which is the typical header of SIP message.
TlsId	string	Represents the TLS ID for the media stream. The TlsId is formatted as the pattern defined in IETF RFC 8842 [54].  Pattern: <code>^[A-Za-z0-9+/_-]{20,255}&amp;#36;</code>  For example: 'abc3de65cddef001be82'.
ImsTranspInfo	object	To carry transparent objects for IMS exposure services.

## 5.11.3 Enumerations

### 5.11.3.1 Enumeration: MediaResourceType

The enumeration MediaResourceType indicates the type of media resource. It shall comply with the provisions defined in Table 5.11.3.1-1.

Table 5.11.3.1-1: Enumeration MediaResourceType

Enumeration value	Description	Applicability
"DC"	Data Channel.	
"AUDIO"	Audio	
"VIDEO"	Video	

### 5.11.3.2 Enumeration: MediaProxy

The enumeration MediaProxy represents the media proxy configuration applicable to the media flow. It shall comply with the provisions defined in Table 5.11.3.2-1.

**Table 5.11.3.2-1: Enumeration MediaProxy**

Enumeration value	Description	Applicability
"HTTP_PROXY"	Represents the media proxy configuration is HTTP Proxy.	
"UDP_PROXY"	Represents the media proxy configuration is UDP Proxy.	
"DC_APPLICATION_PROXY"	Represents the media proxy configuration is DC Application Proxy.	

### 5.11.3.3 Enumeration: SecuritySetup

The enumeration SecuritySetup represents the security setup of the DTLS connection. It shall comply with the provisions defined in Table 5.11.3.3-1.

**Table 5.11.3.3-1: Enumeration SecuritySetup**

Enumeration value	Description	Applicability
"ACTIVE"	Represents the endpoint will initiate an outgoing connection.	
"PASSIVE"	Represents the endpoint will accept an incoming connection.	
"ACTPASS"	Represents the endpoint is willing to accept an incoming connection or to initiate an outgoing connection.	

### 5.11.3.4 Enumeration: BdcUsedBy

The enumeration BdcUsedBy represents the party uses the bootstrap data channel in the media description. It shall comply with the provisions defined in Table 5.11.3.4-1.

**Table 5.11.3.4-1: Enumeration BdcUsedBy**

Enumeration value	Description	Applicability
"SENDER"	Represents the bootstrap data channel is used by the UE sending this SDP.	
"RECEIVER"	Represents the bootstrap data channel is used for the UE receiving the SDP.	

### 5.11.3.5 Enumeration: AdcEndpointType

The enumeration AdcEndpointType represents the remote endpoint type of the application data channel. It shall comply with the provisions defined in Table 5.11.3.5-1.

**Table 5.11.3.5-1: Enumeration AdcEndpointType**

Enumeration value	Description	Applicability
"UE"	Represents the remote endpoint type of the application data channel is the peer UE.	
"SERVER"	Represents the remote endpoint type of the application data channel is the application server.	

### 5.11.3.6 Enumeration: ImsEvent

The enumeration ImsEvent represents the IMS events. It shall comply with the provisions defined in Table 5.11.3.6-1.

**Table 5.11.3.6-1: Enumeration ImsEvent**

Enumeration value	Description	Applicability
"ADC_ESTABLISHMENT"	The application data channel establishment event.	
"ADC_RELEASE"	The application data channel release event.	
"BDC_ESTABLISHMENT"	The bootstrap data channel establishment event.	
"BDC_RELEASE"	The bootstrap data channel release event.	
"ADC_IWK_ESTABLISHMENT"	The application data channel requiring interworking establishment event.	

NOTE: Values in table 5.11.3.6-1 include the standardized IMS event types. However, the actual values of IMS event types and corresponding event filters are transparent for the different NF service producers (e.g. HSS). This allows that additional standardized as well as non-standardized event types can be accepted even if the semantics are unknown by e.g. the NRF, HSS, NEF.

### 5.11.3.7 Type: AdcStatus

**Table 5.11.3.7-1: Enumeration AdcStatus**

Enumeration value	Description
"ADC_ESTABLISHED"	Application data channel established.
"ADC_RELEASED"	Application data channel released.
"ADC_IWK_ESTABLISHED"	Application data channel requiring interworking established.

### 5.11.3.8 Type: BdcStatus

**Table 5.11.3.8-1: Enumeration BdcStatus**

Enumeration value	Description
"BDC_ESTABLISHED"	Bootstrap data channel established.
"BDC_RELEASED"	Bootstrap data channel released.

### 5.11.3.9 Enumeration: ImsReportMode

**Table 5.11.3.9-1: Enumeration ImsReportMode**

Enumeration value	Description
"ON_EVENT_DETECTION"	The report is sent based on event detection.
"PERIODIC"	The report is periodically sent.

### 5.11.3.10 Enumeration: RenderingMode

The enumeration RenderingMode represents the rendering mode for avatar media. It shall comply with the provisions defined in Table 5.11.3.10-1.

**Table 5.11.3.10-1: Enumeration RenderingMode**

Enumeration value	Description	Applicability
"UE_CENTRIC"	The UE centric rendering mode for avatar media.	
"NET_CENTRIC_MF"	The network centric with MF rendering mode for avatar media.	
"NET_CENTRIC_DCAS"	The network centric with DCAS rendering mode for avatar media.	

## 5.11.4 Structured Data Types

### 5.11.4.1 Type: DcEndpoint

**Table 5.11.4.1-1: Definition of type DcEndpoint**

Attribute name	Data type	P	Cardinality	Description
sctpPort	integer	M	1	Represent the local or remote port for the Data Channel. The SctpPort is formatted as the pattern defined in IETF RFC 8841 [55]. Minimum = 0. Maximum = 65535.
fingerprint	Fingerprint	O	0..1	Represents the local or remote certificate fingerprint for the DTLS association. This attribute is deprecated and replaced by the "fingerprints" attribute..
fingerprints	array(Fingerprint)	O	1..N	Represents the certificate fingerprints for the DTLS association.
tlsId	TlsId	O	0..1	Represents the local or remote TLS ID for the media stream.
securitySetup	SecuritySetup	O	0..1	Represents the security set up of the DTLS association.

## 5.11.4.2 Type: DcStream

Table 5.11.4.2-1: Definition of type DcStream

Attribute name	Data type	P	Cardinality	Description
streamId	integer	M	1	Identifies the data channel stream.  The value range of the stream id is an unsigned 16-bit integer, i.e. 0 to 65535. Minimum = 0. Maximum = 65535.  The 0-999 is used for Bootstrap Data Channel. The 1000-65535 is used for Application Data Channel.
subprotocol	string	O	0..1	Represents the subprotocol of the SCTP stream. It defaults to "http" if the mediaId represents bootstrap data channel. (NOTE 1)
order	boolean	O	0..1	Represents the stream is ordered or not, "true" for ordered delivery and "false" for unordered delivery. (NOTE 1)
maxRetry	integer	O	0..1	Represents the maximal number of the times a message will be retransmitted. Default value: 0 (NOTE 1) (NOTE 2)
maxTime	integer	O	0..1	Represents the maximal lifetime in milliseconds after which a message will no longer be transmitted or retransmitted. Default value: 0. (NOTE 1) (NOTE 2)
priority	integer	O	0..1	Represents the priority of data channel relative to other data channels. Default value: 256. (NOTE 1)
NOTE 1: The IE cannot be changed once the media has been established.				
NOTE 2: At most one of the two attributes shall be present.				

## 5.11.4.3 Type: ReplaceHttpRequest

Table 5.11.4.3-1: Definition of type ReplaceHttpRequest

Attribute name	Data type	P	Cardinality	Description
replaceHttpRequest	Uri	M	1	Represents the replacement HTTP URL per stream ID allocated by the application layer for the specific IMS subscriber when requesting the application list (e.g., graphical user interface) via the MDC1 interface.
streamId	integer	M	1	Represents the stream ID that the replaceHttpRequest apply to. The value range of the stream id is an unsigned 16-bit integer, i.e. 0 to 65535. Minimum = 0. Maximum = 65535.  This attribute can only set to 0 or 100 here for Bootstrap Data Channel.

## 5.11.4.4 Type: Endpoint

Table 5.11.4.4-1: Definition of type Endpoint

Attribute name	Data type	P	Cardinality	Description	Applicability
ip	IpAddr	M	1	Represents the IP address of the endpoint.	
transport	TransportProtocol	M	1	Represents the transport protocol.	
portNumber	UInteger	M	1	Represents the TCP or UDP port number of the endpoint.	

## 5.11.4.5 Type: AppBindingInfo

Table 5.11.4.5-1: Definition of type AppBindingInfo

Attribute name	Data type	P	Cardinality	Description
applicationId	string	M	1	Identifies the application.
appDclInfo	AppDclInfo	O	0..1	Represents the application data channel is intened towards to a server or the remote UE. This attribute is deprecated; the attribute "appDclInfoList" should be used instead.
appDclInfoList	array(AppDclInfo)	O	1..N	This attribute provides information of the remote endpoint type of application data channels.

## 5.11.4.6 Type: AppDclInfo

Table 5.11.4.6-1: Definition of type AppDclInfo

Attribute name	Data type	P	Cardinality	Description
streamId	integer	M	1	Represents the stream ID of the data channel.
adcEndpointType	AdcEndpointType	O	0..1	Represents the remote endpoint type of the application data channel

## 5.11.4.7 Type: MdcEndpoint

Table 5.11.4.7-1: Definition of type MdcEndpoint

Attribute name	Data type	P	Cardinality	Description	Applicability
ip	IpAddr	M	1	Represents the IP address of the endpoint.	
portNumber	UInteger	M	1	Represents the TCP or UDP or SCTP port number over IP layer.	
sctpPort	UInteger	C	0..1	Represents the SCTP port number over DTLS. The sctpPort is formatted as the pattern defined in IETF RFC 8841 [55]. Minimum = 0. Maximum = 65535.  This attribute shall be present for SCTP connection over DTLS.	
fingerprint	Fingerprint	C	0..1	Represents the certificate fingerprint for the DTLS association. This attribute shall be present for DTLS connection.  This attribute is deprecated and replaced by the "fingerprints" attribute.	
fingerprints	array(Fingerprint)	C	1..N	Represents the certificate fingerprints for the DTLS association.  This attribute shall be present for DTLS connection.	
tlsId	TlsId	C	0..1	Represents the TLS ID for the DTLS connection.	
securitySetup	SecuritySetup	O	0..1	Represents the security set up of the DTLS association.  This attribute may be present for DTLS connection.	

## 5.11.4.8 Type: ImsReportingOptions

Table 5.11.4.8: Definition of type ImsReportingOptions

Attribute name	Data type	P	Cardinality	Description
reportMode	ImsReportMode	O	0..1	Indicates the mode of report (e.g, periodic reporting along with periodicity, reporting based on event detection). See clause 4.15.1 of 3GPP TS23.502 [3]. If this attribute is absent, the default reportMode shall be "ON_EVENT_DETECTION". It shall not be included if oneTimeReport is included.
oneTimeReport	boolean	O	0..1	This IE may be included only if ImmediateReport is requested.  - true: Indicates that a single notification or status report is requested.  - false or absent: Indicates that continuous notification is requested after the immediate report (if any) with the current associated status is returned in the response.
oneTimeNotification	boolean	O	0..1	- true: Indicates that a single notification (one-time notification) is requested.  - false or absent: Indicates that continuous notification is requested.  (NOTE 1)
maxNumOfReports	Integer	C	0..1	Maximum number of reports. If the event subscription is for a group of UEs, this parameter shall be applied to each individual member UE of the group. (NOTE 2)
reportPeriod	DurationSec	C	0..1	Indicates the interval time between which the event notification is reported, shall be present if reportMode is "PERIODIC".
expiry	DateTime	C	0..1	This IE shall be included in an event subscription response, if, based on operator policy, the IMS AS needs to include an expiry time, and may be included in an event subscription request. When present, this IE shall represent the time at which monitoring shall cease and the subscription becomes invalid. If the maxNumOfReports included in an event subscription response is 1 and if an event report is included in the subscription response, then the value of the expiry included in the response shall be an immediate timestamp. (NOTE 2)
NOTE 1: If immediate report is requested and the current status associated to the event is returned, it shall not be considered a notification report about the event detection for e.g. maximum number of reports.				
NOTE 2: If both "maxNumOfReports" and "expiry" are included, the subscription will expire as soon as one of the conditions is met. If the reportMode attribute is set to "PERIODIC", at least one of the "maxNumOfReports" and "expiry" attributes shall be included. If "oneTimeReport" is included, "maxNumOfReports" shall not be included.				

## 5.11.4.9 Type: ImsEventConfiguration

Table 5.11.4.9-1: Definition of type ImsEventConfiguration

Attribute name	Data type	P	Cardinality	Description
imsEvent	ImsEvent	M	1	The type of the subscribed event.
eventInfo	EventInformation	O	0..1	Additional configuration information related to the specific event type.
reqCurrentStatus	boolean	O	0..1	- true: Current status related to the event subscribed (if available) is requested to be provided in the response.  - false (default): Current status related to the event subscribed (if available) is not requested to be provided in the response.  (NOTE 1, NOTE 2)
imsEventFilters	array(ImsEventFilter)	O	1..N	List of IMS event filters.
NOTE 1: The current status related to the subscribed event shall not be considered as a notification report about the event detection for e.g. Maximum number of reports.				
NOTE 2: This IE correspond to Immediate Report Indication, see 3GPP TS 23.502 [28], table 4.15.1-1				

## 5.11.4.10 Type: EventInformation

Table 5.11.4.10-1: Definition of type EventInformation

Attribute name	Data type	P	Cardinality	Description
imsTranspEventConfig	ImsTranspInfo	O	0..1	Transparent event configuration for the IMS event

## 5.11.4.11 Type: ImsEventFilter

Table 5.11.4.11-1: Definition of type ImsEventFilter

Attribute name	Data type	P	Cardinality	Description
callingId	string	O	0..1	Represents the public identity of the calling subscriber. String containing an IMS Public Identity in SIP URI format or TEL URI format, as specified 3GPP TS 23.003 [7]  Pattern: " <sup>^</sup> (sip\:([a-zA-Z0-9_!\~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:[+0-9]{5,15}))\$"
calledId	string	O	0..1	Represents the public identity of the called subscriber. String containing an IMS Public Identity in SIP URI format or TEL URI format, as specified 3GPP TS 23.003 [7]  Pattern: " <sup>^</sup> (sip\:([a-zA-Z0-9_!\~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:[+0-9]{5,15}))\$"
appBinInfo	AppBindingInfo	O	0..1	Represents the data channel application binding information. It may be included if the event is "ADC_ESTABLISHMENT", "ADC_RELEASE" or "ADC_IWK_ESTABLISHMENT".
sessionId	SessionId	O	0..1	The IMS session ID.
imsTranspFilter	ImsTranspInfo	O	0..1	Transparent filter for the IMS event

Editor's Note: It is FFS to determine whether calling and called IDs should allow multiple identities (i.e. if they should be modelled as an array of PublicIdentities).

## 5.11.4.12 Type: ImsEventReport

Table 5.11.4.12-1: Definition of type ImsEventReport

Attribute name	Data type	P	Cardinality	Description
event	ImsEvent	M	1	Event that is reported.
eventReport	ImsEventReportInfo	O	0..1	Report Information per event type.
sessionId	SessionId	O	0..1	Identifies the session ID.

## 5.11.4.13 Type: ImsEventReportInfo

Table 5.11.4.13-1: Definition of type ImsEventReportInfo

Attribute name	Data type	P	Cardinality	Description
adcReport	AdcReport	O	0..1	Report application data channel.
bdcReport	BdcReport	O	0..1	Report bootstrap data channel.
imsTranspReport	ImsTranspInfo	O	0..1	Transparent Report for the IMS event

## 5.11.4.14 Type: AdcReport

Table 5.11.4.14-1: Definition of type AdcReport

Attribute name	Data type	P	Cardinality	Description
adcStatus	AdcStatus	M	1	ADC event status.

## 5.11.4.15 Type: BdcReport

Table 5.11.4.15-1: Definition of type BdcReport

Attribute name	Data type	P	Cardinality	Description
bdcStatus	BdcStatus	M	1	BDC event status.

## 5.11.4.16 Type: RcdProperties

Table 5.11.4.16-1: Definition of type RcdProperties

Attribute name	Data type	P	Cardinality	Description
rcdSrvAddr	ServerAddressingInfo	O	0..1	Represents the address of an RCD server in a third party network storing IMS subscriber specific RCD information.
rcdUrl	Uri	O	0..1	Represents the URL from where RCD information of a specific IMS subscriber stored at an RCD server can be retrieved from.
rcdInfo	RcdInformation	O	0..1	Indicates a collection of RCD properties associated with an IMS subscriber e.g. caller name, company name, e-mail address, telephone number, job title as specified in IETF RFC 9796 [75] and represented as a jCard JSON object.

## 5.11.4.17 Type: RcdInformation

Table 5.11.4.17-1: Definition of type RcdInformation

Attribute name	Data type	P	Cardinality	Description
identifProps	IdentificationProperties	M	1	Represents the identity information of the entity associated with the jCard.
delvAddrProps	DeliveringAddrProperties	O	0..1	Represents the information related to the delivery address of the entity associated with the jCard.
commsProps	CommunicationsProperties	O	0..1	Indicates how to communicate with the entity associated with the jCard.
geogrProps	GeographicalProperties	O	0..1	Represents the geographical information associated with the entity associated with the jCard.
organProps	OrganizationalProperties	O	0..1	Represents the information associated with characteristics of the organization or organizational units of the entity associated with the jCard.
explanProps	ExplanatoryProperties	O	0..1	Indicates an additional information such as an application category information or notes that are specific to the entity associated with the jCard.

## 5.11.4.18 Type: IdentificationProperties

Table 5.11.4.18-1: Definition of type IdentificationProperties

Attribute name	Data type	P	Cardinality	Description
fns	array(string)	M	1..N	Represent the "fn" property which provides a formatted text corresponding to the name of the object the jCard represents as defined in IETF RFC 6350 [76], section 6.2.1.
nProp	string	O	0..1	Represent the "n" property which provides the components of the name of the object the jCard represents as defined in IETF RFC 6350 [76], section 6.2.2.  Value type: A single structured text value. The text components are separated by a semicolon character. Each component may have multiple values separated by a comma character.
nickNames	array(string)	O	1..N	Represent the "nickname" property which provides the text corresponding to the nickname of the object the jCard represents as defined in IETF RFC 6350 [76], section 6.2.3.  Value type: One or more text values separated by a comma character.
photos	array(Uri)	O	1..N	Represent the "photo" property which provides image or photograph information that annotates some aspect of the object the jCard represents as defined in IETF RFC 6350 [76], section 6.2.4.

## 5.11.4.19 Type: DeliveringAddrProperties

Table 5.11.4.19-1: Definition of type DeliveringAddrProperties

Attribute name	Data type	P	Cardinality	Description
adrs	array(string)	O	1..N	<p>Represent the "adr" property which provides the delivery address of the object the jCard represents as defined in IETF RFC 6350 [76], section 6.3.1.</p> <p>Value type: A single structured text value separated by a semicolon character. Each component may have multiple values separated by a comma character.</p>

## 5.11.4.20 Type: CommunicationsProperties

Table 5.11.4.20-1: Definition of type CommunicationsProperties

Attribute name	Data type	P	Cardinality	Description
tels	array(string)	O	1..N	<p>Represent the "tel" property which provides the telephone number for the object the jCard represents as defined in IETF RFC 6350 [76], section 6.4.1.</p> <p>Value type: By default, it is a single free-form text value.</p>
emails	array(string)	O	1..N	<p>Represent the "email" property which provides the electronic mail address of the object the jCard represents as defined in IETF RFC 6350 [76], section 6.4.2.</p> <p>Value type: A single text value.</p>
langs	array(string)	O	1..N	<p>Represent the "lang" property which provides the language(s) that may be used for communicating with the object the jCard represents as defined in IETF RFC 6350 [76], section 6.4.4.</p> <p>Value type: A single language-tag value.</p>

## 5.11.4.21 Type: GeographicalProperties

Table 5.11.4.21-1: Definition of type GeographicalProperties

Attribute name	Data type	P	Cardinality	Description
tzs	array(string)	O	1..N	<p>Represent the "tz" property which provides the time zone of the object the jCard represents as defined in IETF RFC 6350 [76], section 6.5.1.</p> <p>Value type: The default is a single text value. It can also be reset to a single URI or a UTC-offset value.</p>
geos	array(Uri)	O	1..N	<p>Represent the "geo" property which provides the global positioning of the object the jCard represents as defined in IETF RFC 6350 [76], section 6.5.2.</p> <p>Value type: A single URI.</p>

## 5.11.4.22 Type: OrganizationalProperties

Table 5.11.4.22-1: Definition of type OrganizationalProperties

Attribute name	Data type	P	Cardinality	Description
titles	array(string)	O	1..N	<p>Represent the "title" property which has the intent of providing the position or job of the object the jCard represents as defined in IETF RFC 6350 [76], section 6.6.1.</p> <p>Value type: A single text value.</p>
roles	array(string)	O	1..N	<p>Represent the "role" property which has the intent of providing the position or job of the object the jCard represents as defined in IETF RFC 6350 [76], section 6.6.2.</p> <p>Value type: A single text value.</p>
logos	array(Uri)	O	1..N	<p>Represent the "logo" property which has the intent of specifying a graphic image of a logo associated with the object the jCard represents as defined in IETF RFC 6350 [76], section 6.6.3.</p> <p>Value type: A single URI.</p>
orgs	array(string)	O	1..N	<p>Represent the "org" property which has the intent of specifying the organizational name and units of the object the jCard represents as defined in IETF RFC 6350 [76], section 6.6.4.</p> <p>Value type: A single structured text value consisting of components separated by a semicolon character.</p>

## 5.11.4.23 Type: ExplanatoryProperties

Table 5.11.4.23-1: Definition of type ExplanatoryProperties

Attribute name	Data type	P	Cardinality	Description
categories	array(string)	O	1..N	Represent the "categories" property which specifies application category information about the object the jCard represents as defined in IETF RFC 6350 [76], section 6.7.1.  Value type: One or more text values separated by a comma character.
notes	array(string)	O	1..N	Represent the "note" property which specifies supplemental information or a comment about the object the jCard represents as defined in IETF RFC 6350 [76], section 6.7.2.  Value type: A single text value.
sounds	array(Uri)	O	1..N	Represent the "sound" property which specifies digital sound content information that annotates some aspect of the object the jCard represents as defined in IETF RFC 6350 [76], section 6.7.5.  Value type: A single URI.
uid	Uri	O	0..1	Represent the "uid" property which specifies a globally unique identifier corresponding to the object the jCard represents as defined in IETF RFC 6350 [76], section 6.7.6.  Value type: A single URI value. It MAY also be reset to free-form text.
urls	array(Uri)	O	1..N	Represent the "url" property which specifies a uniform resource locator associated with the object the jCard represents as defined in IETF RFC 6350 [76], section 6.7.8.  Value type: A single uri value.
version	string	M	1	Represent the "version" property which specifies the version of the vCard specification used to format this vCard as defined in IETF RFC 6350 [76], section 6.7.9.  Value type: A single text value.

## 5.12 Data Types related to Ambient IoT

## 5.12.1 Introduction

This clause defines common data types related to Ambient IoT.

## 5.12.2 Simple Data Types

This clause specifies common simple data types.

Table 5.12.2-1: Simple Data Types

Type Name	Type Definition	Description
AiotAreaCode	string	Represents the AIoT area code encoded as a three octet string in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits shall appear first in the string, and the character representing the 4 least significant bit shall appear last in the string.  Octets shall be coded according to 3GPP TS 32.422 [19].  Pattern: '^[A-Fa-f0-9]{6}\$'
AiotFilteringInformation	Bytes	String that uniquely represents an AIoT Filtering Information which is used to identify or filter multiple AIoT Devices. See clause 31.3 of 3GPP TS 23.003 [7].  String with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters.
AiotDevPerId	Bytes	String that uniquely represents an AIoT Device Permanent Identifier, as specified in clause 31.2 of 3GPP TS 23.003 [7].  String with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters

### 5.12.3 Enumerations

### 5.12.4 Structured Data Types

#### 5.12.4.1 Type: AiotArea

Table 5.12.4.1-1: Definition of type AiotArea

Attribute name	Data type	P	Cardinality	Description
arealds	array(AiotAreald)	M	1..N	Contains a list of AIoT Area ID(s) which represent the AIoT Service Area.

#### 5.12.4.2 Type: AiotAreald

Table 5.12.4.2-1: Definition of type AiotAreald

Attribute name	Data type	P	Cardinality	Description
plmnId	PlmnId	M	1	PLMN ID
nid	Nid	O	0..1	Network identity
aiotAreaCode	AiotAreaCode	M	1	AIoT area code

---

# Annex A (normative): OpenAPI specification

## A.1 General

This Annex specifies the formal definition of common data types. It consists of an OpenAPI 3.0.0 specification, in YAML format.

This Annex takes precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API(s).

NOTE 1: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification files contained in this 3GPP Technical Specification are available on a Git-based repository, that uses the GitLab software version control system (see 3GPP TS 29.501 [2] clause 5.3.1 and 3GPP TR 21.900 [27] clause 5B)

---

## A.2 Data related to Common Data Types

```
openapi: 3.0.0

info:
  version: '1.6.0-alpha.5'

  title: 'Common Data Types'
  description: |
    Common Data Types for Service Based Interfaces.
    © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: 3GPP TS 29.571 Common Data Types for Service Based Interfaces, version 19.4.0
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.571/'

paths: {}
components:
  schemas:

#
# Common Data Types for Generic usage definitions as defined in clause 5.2
#

#
# COMMON SIMPLE DATA TYPES
#

  Binary:
    format: binary
    type: string
    description: string with format 'binary' as defined in OpenAPI.

  BinaryRm:
    format: binary
    type: string
    nullable: true
    description: >
      "string with format 'binary' as defined in OpenAPI OpenAPI with 'nullable: true' property."

  Bytes:
    format: byte
    type: string
    description: string with format 'bytes' as defined in OpenAPI
```

BytesRm:  
format: byte  
type: string  
nullable: true  
description: >  
string with format 'bytes' as defined in OpenAPI OpenAPI with 'nullable: true' property.

Date:  
format: date  
type: string  
description: string with format 'date' as defined in OpenAPI.

DateRm:  
format: date  
type: string  
nullable: true  
description: >  
string with format 'date' as defined in OpenAPI OpenAPI with 'nullable: true' property.

DateTime:  
format: date-time  
type: string  
description: string with format 'date-time' as defined in OpenAPI.

DateTimeRm:  
format: date-time  
type: string  
nullable: true  
description: >  
string with format 'date-time' as defined in OpenAPI with 'nullable:true' property.

DiameterIdentity:  
\$ref: '#/components/schemas/Fqdn'

DiameterIdentityRm:  
\$ref: '#/components/schemas/FqdnRm'

Double:  
format: double  
type: number  
description: string with format 'double' as defined in OpenAPI

DoubleRm:  
format: double  
type: number  
nullable: true  
description: >  
string with format 'double' as defined in OpenAPI with 'nullable: true' property.

DurationSec:  
type: integer  
description: indicating a time in seconds.

DurationSecRm:  
type: integer  
nullable: true  
description: "indicating a time in seconds with OpenAPI defined 'nullable: true' property."

Float:  
format: float  
type: number  
description: string with format 'float' as defined in OpenAPI.

FloatRm:  
format: float  
type: number  
nullable: true  
description: >  
string with format 'float' as defined in OpenAPI with the OpenAPI defined  
'nullable: true' property.

Int32:  
format: int32  
type: integer  
description: string with format 'int32' as defined in OpenAPI.

Int32Rm:  
format: int32

```

type: integer
nullable: true
description: >
  string with format 'int32' as defined in OpenAPI with the OpenAPI defined
  'nullable: true' property.

Int64:
type: integer
format: int64
description: string with format 'int64' as defined in OpenAPI.

Int64Rm:
format: int64
type: integer
nullable: true
description: >
  string with format 'int64' as defined in OpenAPI with the OpenAPI defined
  'nullable: true' property.

Ipv4Addr:
type: string
pattern: '^(([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.)}{3}([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])$'
example: '198.51.100.1'
description: >
  String identifying a IPv4 address formatted in the 'dotted decimal' notation
  as defined in RFC 1166.

Ipv4AddrRm:
type: string
pattern: '^(([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.)}{3}([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])$'
example: '198.51.100.1'
nullable: true
description: >
  String identifying a IPv4 address formatted in the 'dotted decimal' notation
  as defined in RFC 1166 with the OpenAPI defined 'nullable: true' property.

Ipv4AddrMask:
type: string
pattern: '^(([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.)}{3}([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])(\./([0-9]|[1-2][0-9]|3[0-2]))$'
example: '198.51.0.0/16'
description: >
  "String identifying a IPv4 address mask formatted in the 'dotted decimal' notation
  as defined in RFC 1166."

Ipv4AddrMaskRm:
type: string
pattern: '^(([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.)}{3}([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])(\./([0-9]|[1-2][0-9]|3[0-2]))$'
example: '198.51.0.0/16'
nullable: true
description: >
  String identifying a IPv4 address mask formatted in the 'dotted decimal' notation
  as defined in RFC 1166 with the OpenAPI defined 'nullable: true' property.

Ipv6Addr:
type: string
allOf:
  - pattern: '^((:|(0?|([1-9a-f][0-9a-f]{0,3})))|((0?|([1-9a-f][0-9a-f]{0,3})))|{0,6}(:|(0?|([1-9a-f][0-9a-f]{0,3})))$)'
  - pattern: '^((([:]+){7}([^:]+))|((([:]+)*[:]+)??:(([:]+)*[:]+)?))$'
example: '2001:db8:85a3::8a2e:370:7334'
description: >
  String identifying an IPv6 address formatted according to clause 4 of RFC5952.
  The mixed IPv4 IPv6 notation according to clause 5 of RFC5952 shall not be used.

Ipv6AddrRm:
type: string
allOf:
  - pattern: '^((:|(0?|([1-9a-f][0-9a-f]{0,3})))|((0?|([1-9a-f][0-9a-f]{0,3})))|{0,6}(:|(0?|([1-9a-f][0-9a-f]{0,3})))$)'
  - pattern: '^((([:]+){7}([^:]+))|((([:]+)*[:]+)??:(([:]+)*[:]+)?))$'
example: '2001:db8:85a3::8a2e:370:7334'
nullable: true
description: >
  String identifying an IPv6 address formatted according to clause 4 of RFC5952 with the

```



```

type: integer
minimum: 0
maximum: 65535
nullable: true
description: >
  Integer where the allowed values correspond to the value range of an unsigned
  16-bit integer with the OpenAPI 'nullable: true' property.

Uint32:
type: integer
minimum: 0
maximum: 4294967295 #(2^32)-1
description: >
  Integer where the allowed values correspond to the value range of an unsigned
  32-bit integer.

Uint32Rm:
format: int32
type: integer
minimum: 0
maximum: 4294967295 #(2^32)-1
nullable: true
description: >
  Integer where the allowed values correspond to the value range of an unsigned
  32-bit integer with the OpenAPI 'nullable: true' property.

Uint64:
type: integer
minimum: 0
maximum: 18446744073709551615 #(2^64)-1
description: >
  Integer where the allowed values correspond to the value range of an
  unsigned 64-bit integer.

Uint64Rm:
type: integer
minimum: 0
maximum: 18446744073709551615 #(2^64)-1
nullable: true
description: >
  Integer where the allowed values correspond to the value range of an unsigned
  16-bit integer with the OpenAPI 'nullable: true' property.

Uri:
type: string
description: String providing an URI formatted according to RFC 3986.

UriRm:
type: string
nullable: true
description: >
  String providing an URI formatted according to RFC 3986 with the OpenAPI
  'nullable: true' property.

VarUeId:
type: string
pattern: '^(imsi-[0-9]{5,15}|nai-.+|msisdn-[0-9]{5,15}|extid-[^@]+@[^@]+|gci-.+|gli-.+|.+)$(
description: String represents the SUPI or GPSI

VarUeIdRm:
type: string
pattern: '^(imsi-[0-9]{5,15}|nai-.+|msisdn-[0-9]{5,15}|extid-[^@]+@[^@]+|gci-.+|gli-.+|.+)$(
nullable: true
description: "String represents the SUPI or GPSI with the OpenAPI 'nullable: true' property."

TimeZone:
type: string
example: '-08:00+1'
description: |
  String with format "time-numoffset" optionally appended by "daylightSavingTime", where
  - "time-numoffset" shall represent the time zone adjusted for daylight saving time and be
    encoded as time-numoffset as defined in clause 5.6 of IETF RFC 3339;
  - "daylightSavingTime" shall represent the adjustment that has been made and shall be
    encoded as "+1" or "+2" for a +1 or +2 hours adjustment.

  The example is for 8 hours behind UTC, +1 hour adjustment for Daylight Saving Time.

TimeZoneRm:

```

```

type: string
nullable: true
description: |
  "String with format 'time-numoffset' optionally appended by '<daylightSavingTime>', where
  - 'time-numoffset' shall represent the time zone adjusted for daylight saving time and be
  encoded as time-numoffset as defined in clause 5.6 of IETF RFC 3339;
  - 'daylightSavingTime' shall represent the adjustment that has been made and shall be
  encoded as '+1' or '+2' for a +1 or +2 hours adjustment.

  But with the OpenAPI 'nullable: true' property."
StnSr:
  type: string
  description: String representing the STN-SR as defined in clause 18.6 of 3GPP TS 23.003.
StnSrRm:
  type: string
  nullable: true
  description: >
    String representing the STN-SR as defined in clause 18.6 of 3GPP TS 23.003
    with the OpenAPI 'nullable: true' property.
Cmsisdn:
  type: string
  pattern: '^([0-9]){5,15}$'
  description: String representing the C-MSISDN as defined in clause 18.7 of 3GPP TS 23.003.
CmsisdnRm:
  type: string
  pattern: '^([0-9]){5,15}$'
  nullable: true
  description: >
    String representing the C-MSISDN as defined in clause 18.7 of 3GPP TS 23.003 with
    the OpenAPI 'nullable: true' property.
MonthOfYear:
  type: integer
  minimum: 1
  maximum: 12
  description: >
    integer between and including 1 and 12 denoting a month. 1 shall indicate January,
    and the subsequent months shall be indicated with the next higher numbers.
    12 shall indicate December.
DayOfWeek:
  type: integer
  minimum: 1
  maximum: 7
  description: >
    integer between and including 1 and 7 denoting a weekday. 1 shall indicate Monday,
    and the subsequent weekdays shall be indicated with the next higher numbers.
    7 shall indicate Sunday.
TimeOfDay:
  type: string
  description: >
    String with format partial-time or full-time as defined in clause 5.6 of IETF RFC 3339.
    Examples, 20:15:00, 20:15:00-08:00 (for 8 hours behind UTC).
EmptyObject:
  description: Empty JSON object { }, it is defined with the keyword additionalProperties false
  type: object
  additionalProperties: false
Fqdn:
  description: Fully Qualified Domain Name
  type: string
  pattern: '^([0-9A-Za-z]([0-9A-Za-z]{0,61}[0-9A-Za-z])?\.)+[A-Za-z]{2,63}\.?$'
  minLength: 4
  maxLength: 253
FqdnRm:
  description: Fully Qualified Domain Name, but it also allows the null value
  anyOf:
    - $ref: '#/components/schemas/Fqdn'
    - $ref: '#/components/schemas/NullValue'

```

#

```
# COMMON ENUMERATED DATA TYPES
#

PatchOperation:
  anyOf:
    - type: string
      enum:
        - add
        - copy
        - move
        - remove
        - replace
        - test
    - type: string
      description: Operations as defined in IETF RFC 6902.

UriScheme:
  anyOf:
    - type: string
      enum:
        - http
        - https
    - type: string
      description: HTTP and HTTPS URI scheme.

ChangeType:
  anyOf:
    - type: string
      enum:
        - ADD
        - MOVE
        - REMOVE
        - REPLACE
    - type: string
      description: Indicates the type of change to be performed.

HttpMethod:
  anyOf:
    - type: string
      enum:
        - GET
        - POST
        - PUT
        - DELETE
        - PATCH
        - OPTIONS
        - HEAD
        - CONNECT
        - TRACE
    - type: string
      description: HTTP methodes.

NullValue:
  enum:
    - null
  description: JSON's null value.

MatchingOperator:
  anyOf:
    - type: string
      enum:
        - FULL_MATCH
        - MATCH_ALL
        - STARTS_WITH
        - NOT_START_WITH
        - ENDS_WITH
        - NOT_END_WITH
        - CONTAINS
        - NOT_CONTAIN
    - type: string
      description: the matching operation.

UpfPacketInspectionFunctionality:
  description: Indicates a packet inspection functionality of the UPF.
  anyOf:
    - type: string
      enum:
```

```

    - DEEP_PACKET_INSPECTION
    - MAC_FILTER_BASED_PACKET_DETECTION
    - IP_FILTER_BASED_PACKET_DETECTION
  - type: string
    description: >
      This string provides forward-compatibility with future
      extensions to the enumeration.

```

```

#
# COMMON STRUCTURED DATA TYPES
#

```

```

ProblemDetails:
  description: Provides additional information in an error response.
  type: object
  properties:
    type:
      $ref: '#/components/schemas/Uri'
    title:
      type: string
    status:
      type: integer
    detail:
      type: string
      description: A human-readable explanation specific to this occurrence of the problem.
    instance:
      $ref: '#/components/schemas/Uri'
    cause:
      type: string
      description: >
        A machine-readable application error cause specific to this occurrence of the problem.
        This IE should be present and provide application-related error information, if
        available.
    invalidParams:
      type: array
      items:
        $ref: '#/components/schemas/InvalidParam'
      minItems: 1
    supportedFeatures:
      $ref: '#/components/schemas/SupportedFeatures'
    accessTokenError:
      $ref: 'TS29510_Nnrf_AccessToken.yaml#/components/schemas/AccessTokenErr'
    accessTokenRequest:
      $ref: 'TS29510_Nnrf_AccessToken.yaml#/components/schemas/AccessTokenReq'
    nrfId:
      $ref: '#/components/schemas/Fqdn'
    supportedApiVersions:
      type: array
      items:
        type: string
      minItems: 1
    noProfileMatchInfo:
      $ref: 'TS29510_Nnrf_NFDiscovery.yaml#/components/schemas/NoProfileMatchInfo'

```

```

Link:
  type: object
  properties:
    href:
      $ref: '#/components/schemas/Uri'
  description: It contains the URI of the linked resource.

```

```

LinkRm:
  type: object
  properties:
    href:
      $ref: '#/components/schemas/Uri'
  nullable: true
  description: >
    It contains the URI of the linked resource with the OpenAPI 'nullable: true' property.

```

```

PatchItem:
  type: object
  properties:
    op:
      $ref: '#/components/schemas/PatchOperation'
    path:
      type: string

```

```

    description: >
      contains a JSON pointer value (as defined in IETF RFC 6901) that references
      a location of a resource on which the patch operation shall be performed.
  from:
    type: string
    description: >
      indicates the path of the source JSON element (according to JSON Pointer syntax)
      being moved or copied to the location indicated by the "path" attribute.
  value: {}
  required:
    - op
    - path
  description: it contains information on data to be changed.

LinksValueSchema:
  oneOf:
    - type: array
      items:
        $ref: '#/components/schemas/Link'
      minItems: 1
    - $ref: '#/components/schemas/Link'
  description: A list of mutually exclusive alternatives of 1 or more links.

SelfLink:
  type: object
  properties:
    self:
      $ref: '#/components/schemas/Link'
  required:
    - self
  description: It contains the URI of the linked resource.

InvalidParam:
  type: object
  properties:
    param:
      type: string
      description: >
        If the invalid parameter is an attribute in a JSON body, this IE shall contain the
        attribute's name and shall be encoded as a JSON Pointer. If the invalid parameter is
        an HTTP header, this IE shall be formatted as the concatenation of the string "header "
        plus the name of such header. If the invalid parameter is a query parameter, this IE
        shall be formatted as the concatenation of the string "query " plus the name of such
        query parameter. If the invalid parameter is a variable part in the path of a resource
        URI, this IE shall contain the name of the variable, including the symbols "{" and "}"
        used in OpenAPI specification as the notation to represent variable path segments.
    reason:
      type: string
      description: >
        A human-readable reason, e.g. "must be a positive integer". In cases involving failed
        operations in a PATCH request, the reason string should identify the operation that
        failed using the operation's array index to assist in correlation of the invalid
        parameter with the failed operation, e.g. "Replacement value invalid for attribute
        (failed operation index= 4)"
  required:
    - param
  description: It contains an invalid parameter and a related description.

ChangeItem:
  type: object
  properties:
    op:
      $ref: '#/components/schemas/ChangeType'
    path:
      type: string
      description: >
        contains a JSON pointer value (as defined in IETF RFC 6901) that references a target
        location within the resource on which the change has been applied.
  from:
    type: string
    description: >
      indicates the path of the source JSON element (according to JSON Pointer syntax)
      being moved or copied to the location indicated by the "path" attribute. It shall
      be present if the "op" attribute is of value "MOVE".
  origValue: {}
  newValue: {}
  required:
    - op

```

```
- path
description: It contains data which need to be changed.

NotifyItem:
  type: object
  required:
    - resourceId
    - changes
  properties:
    resourceId:
      $ref: '#/components/schemas/Uri'
    changes:
      type: array
      items:
        $ref: '#/components/schemas/ChangeItem'
      minItems: 1
  description: Indicates changes on a resource.

ComplexQuery:
  oneOf:
    - $ref: '#/components/schemas/Cnf'
    - $ref: '#/components/schemas/Dnf'
  description: >
    The ComplexQuery data type is either a conjunctive normal form or a disjunctive normal form.
    The attribute names "cnfUnits" and "dnfUnits" (see clause 5.2.4.11 and clause 5.2.4.12)
    serve as discriminator.

Cnf:
  type: object
  required:
    - cnfUnits
  properties:
    cnfUnits:
      type: array
      items:
        $ref: '#/components/schemas/CnfUnit'
      minItems: 1
  description: A conjunctive normal form

Dnf:
  type: object
  required:
    - dnfUnits
  properties:
    dnfUnits:
      type: array
      items:
        $ref: '#/components/schemas/DnfUnit'
      minItems: 1
  description: A disjunctive normal form.

CnfUnit:
  type: object
  required:
    - cnfUnit
  properties:
    cnfUnit:
      type: array
      items:
        $ref: '#/components/schemas/Atom'
      minItems: 1
  description: >
    During the processing of cnfUnits attribute, all the members in the array shall be
    interpreted as logically concatenated with logical "AND".

DnfUnit:
  type: object
  required:
    - dnfUnit
  properties:
    dnfUnit:
      type: array
      items:
        $ref: '#/components/schemas/Atom'
      minItems: 1
  description: >
    During the processing of dnfUnits attribute, all the members in the array shall be
    interpreted as logically concatenated with logical "OR".
```

**Atom:**  
description: contains a search parameter and its positive or negative content.  
type: object  
required:  
- attr  
- value  
properties:  
attr:  
type: string  
description: contains the name of a defined query parameter.  
value: {}  
negative:  
type: boolean  
description: indicates whether the negative condition applies for the query condition.

**PatchResult:**  
description: The execution report result on failed modification.  
type: object  
required:  
- report  
properties:  
report:  
type: array  
items:  
\$ref: '#/components/schemas/ReportItem'  
minItems: 1  
description: >  
The execution report contains an array of report items. Each report item indicates one failed modification.

**ReportItem:**  
type: object  
required:  
- path  
properties:  
path:  
type: string  
description: >  
Contains a JSON pointer value (as defined in IETF RFC 6901) that references a location of a resource to which the modification is subject.  
reason:  
type: string  
description: >  
A human-readable reason providing details on the reported modification failure. The reason string should identify the operation that failed using the operation's array index to assist in correlation of the invalid parameter with the failed operation, e.g. "Replacement value invalid for attribute (failed operation index= 4)".  
description: indicates performed modivications.

**HalTemplate:**  
description: >  
Hypertext Application Language (HAL) template contains the extended 3GPP hypermedia format.  
type: object  
required:  
- method  
properties:  
title:  
type: string  
description: A human-readable string that can be used to identify this template  
method:  
\$ref: '#/components/schemas/HttpMethod'  
contentType:  
type: string  
description: >  
The media type that should be used for the corresponding request. If the attribute is missing, or contains an unrecognized value, the client should act as if the contentType is set to "application/json".  
properties:  
type: array  
items:  
\$ref: '#/components/schemas/Property'  
minItems: 1  
description: >  
The properties that should be included in the body of the corresponding request. If the contentType attribute is set to "application/json", then this attribute describes the attributes of the JSON object of the body.

```

Property:
  description: >
    If the contentType attribute is set to "application/json", then this attribute describes
    the attributes of the JSON object of the body.
  type: object
  required:
    - name
  properties:
    name:
      type: string
      description: The name of the property
    required:
      type: boolean
      description: >
        Indicates whether the property is required - true= required -
        false(default)= not required.
    regex:
      type: string
      description: A regular expression string to be applied to the value of the property.
    value:
      type: string
      description: The property value. When present, it shall be a valid JSON string.

RedirectResponse:
  description: >
    The response shall include a Location header field containing a different URI
    (pointing to a different URI of an other service instance), or the same URI if a request
    is redirected to the same target resource via a different SCP.
  type: object
  properties:
    cause:
      type: string
    targetScp:
      $ref: '#/components/schemas/Uri'
    targetSepp:
      $ref: '#/components/schemas/Uri'

TunnelAddress:
  description: Tunnel address
  type: object
  properties:
    ipv4Addr:
      $ref: '#/components/schemas/Ipv4Addr'
    ipv6Addr:
      $ref: '#/components/schemas/Ipv6Addr'
    portNumber:
      $ref: '#/components/schemas/UInteger'
  required:
    - portNumber
  anyOf:
    - required: [ ipv4Addr ]
    - required: [ ipv6Addr ]

FqdnPatternMatchingRule:
  description: a matching rule for a FQDN pattern
  type: object
  oneOf:
    - required: [ regex ]
    - required: [ stringMatchingRule ]
  properties:
    regex:
      type: string
    stringMatchingRule:
      $ref: '#/components/schemas/StringMatchingRule'

StringMatchingRule:
  description: A list of conditions for string matching
  type: object
  properties:
    stringMatchingConditions:
      type: array
      items:
        $ref: '#/components/schemas/StringMatchingCondition'
      minItems: 1
  required:
    - stringMatchingConditions

```

```
StringMatchingCondition:
  description: A String with Matching Operator
  type: object
  properties:
    matchingString:
      type: string
    matchingOperator:
      $ref: '#/components/schemas/MatchingOperator'
  required:
    - matchingOperator

Ipv4AddressRange:
  description: Range of IPv4 addresses
  type: object
  properties:
    start:
      $ref: '#/components/schemas/Ipv4Addr'
    end:
      $ref: '#/components/schemas/Ipv4Addr'
  required:
    - start
    - end

Ipv6AddressRange:
  description: Range of IPv6 addresses
  type: object
  properties:
    start:
      $ref: '#/components/schemas/Ipv6Addr'
    end:
      $ref: '#/components/schemas/Ipv6Addr'
  required:
    - start
    - end

Ipv6PrefixRange:
  description: Range of IPv6 prefixes
  type: object
  properties:
    start:
      $ref: '#/components/schemas/Ipv6Prefix'
    end:
      $ref: '#/components/schemas/Ipv6Prefix'
  required:
    - start
    - end

NfSignallingInfo:
  description: NF Signalling Information
  type: object
  properties:
    nfInstanceId:
      $ref: '#/components/schemas/NfInstanceId'
    nfSigInfoPerWdw:
      type: array
      items:
        $ref: '#/components/schemas/NfSignallingInfoPerTimeWindow'
      minItems: 1
    nfHeartbeatInfo:
      $ref: '#/components/schemas/NfHeartbeatInfo'
    unexpStatusInd:
      type: boolean
      default: false
  required:
    - nfInstanceId

NfSignallingInfoPerTimeWindow:
  description: NF Signalling Information Per time window
  type: object
  properties:
    tw:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
    nfSigInfoPerService:
      type: array
      items:
        $ref: '#/components/schemas/NfSignallingInfoPerService'
```

```

    minItems: 1
  required:
    - tw
    - nfSigInfoPerService

NfSignallingInfoPerService:
  description: NF signalling information per service.
  type: object
  properties:
    nfServiceInstanceId:
      type: string
    serviceName:
      $ref: 'TS29510_Nnrf_NFManagement.yaml#/components/schemas/ServiceName'
    avgProcTime:
      $ref: '#/components/schemas/Float'
    numOfReq:
      $ref: '#/components/schemas/UInteger'
    numOfReqUnresp:
      $ref: '#/components/schemas/UInteger'
    numOfReqReject:
      $ref: '#/components/schemas/UInteger'
    numOfRedMessages:
      $ref: '#/components/schemas/UInteger'
    numOfPosteriorReq:
      $ref: '#/components/schemas/UInteger'
  required:
    - nfServiceInstanceId
    - serviceName

NfHeartbeatInfo:
  description: NF heart beat information.
  type: object
  properties:
    numOfRetrans:
      $ref: '#/components/schemas/UInteger'
    hbIntvl:
      $ref: '#/components/schemas/UInteger'

#
# Data Types related to Subscription, Identification and Numbering as defined in clause 5.3
#

#
# SIMPLE DATA TYPES
#

Dnn:
  type: string
  description: >
    String representing a Data Network as defined in clause 9A of 3GPP TS 23.003;
    it shall contain either a DNN Network Identifier, or a full DNN with both the Network
    Identifier and Operator Identifier, as specified in 3GPP TS 23.003 clause 9.1.1 and 9.1.2.
    It shall be coded as string in which the labels are separated by dots
    (e.g. "Label1.Label2.Label3").

DnnRm:
  type: string
  nullable: true
  description: >
    String representing a Data Network as defined in clause 9A of 3GPP TS 23.003;
    it shall contain either a DNN Network Identifier, or a full DNN with both the
    Network Identifier and Operator Identifier, as specified in 3GPP TS 23.003 clause 9.1.1
    and 9.1.2. It shall be coded as string in which the labels are separated by dots
    (e.g. 'Label1.Label2.Label3') with the OpenAPI 'nullable: true' property.

WildcardDnn:
  type: string
  pattern: '^[*]*$'
  description: String representing the Wildcard DNN. It shall contain the string "*".

WildcardDnnRm:
  type: string
  pattern: '^[*]*$'
  nullable: true
  description: >
    String representing the Wildcard DNN. It shall contain the string '*' but with the
    OpenAPI 'nullable: true' property.

Gpsi:
  type: string

```

```

pattern: '^(\msisdn-[0-9]{5,15}|extid-[@]+[@]+|.+)$.+'
description: >
  String identifying a Gpsi shall contain either an External Id or an MSISDN.
  It shall be formatted as follows -External Identifier= "extid-'extid'", where 'extid'
  shall be formatted according to clause 19.7.2 of 3GPP TS 23.003 that describes an
  External Identifier.

GpsiRm:
  type: string
  pattern: '^(\msisdn-[0-9]{5,15}|extid-[@]+[@]+|.+)$.+'
  nullable: true
  description: >
    String identifying a Gpsi shall contain either an External Id or an MSISDN. It shall be
    formatted as follows -External Identifier= 'extid-'extid', where 'extid' shall be formatted
    according to clause 19.7.2 of 3GPP TS 23.003 that describes an External Identifier with the
    OpenAPI 'nullable: true' property.

GroupId:
  type: string
  pattern: '^([A-Fa-f0-9]{8}-[0-9]{3}-[0-9]{2,3}-([A-Fa-f0-9][A-Fa-f0-9]){1,10})$.+'
  description: >
    String identifying a group of devices network internal globally unique ID which identifies
    a set of IMSIs, as specified in clause 19.9 of 3GPP TS 23.003.

GroupIdRm:
  type: string
  pattern: '^([A-Fa-f0-9]{8}-[0-9]{3}-[0-9]{2,3}-([A-Fa-f0-9][A-Fa-f0-9]){1,10})$.+'
  nullable: true
  description: >
    String identifying a group of devices network internal globally unique ID which
    identifies a set of IMSIs, as specified in clause 19.9 of 3GPP TS 23.003 with the
    OpenAPI 'nullable: true' property.

ExternalGroupId:
  type: string
  pattern: '^extgroupid-[@]+[@]+$.+'
  description: >
    String identifying External Group Identifier that identifies a group made up of one or
    more subscriptions associated to a group of IMSIs, as specified in clause 19.7.3 of 3GPP
    TS 23.003.

ExternalGroupIdRm:
  type: string
  pattern: '^extgroupid-[@]+[@]+$.+'
  nullable: true
  description: >
    String identifying External Group Identifier that identifies a group made up of one or
    more subscriptions associated to a group of IMSIs, as specified in clause 19.7.3 of
    3GPP TS 23.003 with the OpenAPI 'nullable: true' property.

Pei:
  type: string
  pattern: '^(\imei-[0-9]{15}|imeisv-[0-9]{16}|mac((-[0-9a-fA-F]{2}){6})(-untrusted)?|eui((-[0-
9a-fA-F]{2}){8})|.+)$.+'
  description: >
    String representing a Permanent Equipment Identifier that may contain - an IMEI or IMEISV,
    as specified in clause 6.2 of 3GPP TS 23.003; a MAC address for a 5G-RG or FN-RG via
    wireline access, with an indication that this address cannot be trusted for regulatory
    purpose if this address cannot be used as an Equipment Identifier of the FN-RG, as
    specified in clause 4.7.7 of 3GPP TS23.316. Examples are imei-012345678901234 or
    imeisv-0123456789012345.

PeiRm:
  type: string
  pattern: '^(\imei-[0-9]{15}|imeisv-[0-9]{16}|mac((-[0-9a-fA-F]{2}){6})(-untrusted)?|eui((-[0-
9a-fA-F]{2}){8})|.+)$.+'
  nullable: true
  description: >
    This data type is defined in the same way as the 'Pei' data type but with
    the OpenAPI 'nullable: true' property.

Supi:
  type: string
  pattern: '^(\imsi-[0-9]{5,15}|nai-.|gci-.|gli-.|.+)$.+'
  description: |
    String identifying a Supi that shall contain either an IMSI, a network specific identifier,
    a Global Cable Identifier (GCI) or a Global Line Identifier (GLI) as specified in clause
    2.2A of 3GPP TS 23.003. It shall be formatted as follows

```

- for an IMSI "imsi-<imsi>", where <imsi> shall be formatted according to clause 2.2 of 3GPP TS 23.003 that describes an IMSI.
- for a network specific identifier "nai-<nai>", where <nai> shall be formatted according to clause 28.7.2 of 3GPP TS 23.003 that describes an NAI.
- for a GCI "gci-<gci>", where <gci> shall be formatted according to clause 28.15.2 of 3GPP TS 23.003.
- for a GLI "gli-<gli>", where <gli> shall be formatted according to clause 28.16.2 of 3GPP TS 23.003. To enable that the value is used as part of an URI, the string shall only contain characters allowed according to the "lower-with-hyphen" naming convention defined in 3GPP TS 29.501.

**SupiRm:**

```

type: string
pattern: '^([imsi-[0-9]{5,15}|nai-.|gci-.|gli-.|.+)$$'
nullable: true
description: >
  This data type is defined in the same way as the 'Supi' data type, but with the
  OpenAPI 'nullable: true' property.

```

**NfInstanceId:**

```

type: string
format: uuid
description: >
  String uniquely identifying a NF instance. The format of the NF Instance ID shall be a
  Universally Unique Identifier (UUID) version 4.

```

**AmfId:**

```

type: string
pattern: '^([A-Fa-f0-9]{6})$$'
description: >
  String identifying the AMF ID composed of AMF Region ID (8 bits), AMF Set ID (10 bits)
  and AMF Pointer (6 bits) as specified in clause 2.10.1 of 3GPP TS 23.003. It is encoded
  as a string of 6 hexadecimal characters (i.e., 24 bits).

```

**AmfRegionId:**

```

type: string
pattern: '^([A-Fa-f0-9]{2})$$'
description: >
  String identifying the AMF Region (8 bits) as specified in clause 2.10.1 of
  3GPP TS 23.003. It is encoded as a string of 2 hexadecimal characters (i.e. 8 bits).

```

**AmfSetId:**

```

type: string
pattern: '^([0-3][A-Fa-f0-9]{2})$$'
description: >
  String identifying the AMF Set ID (10 bits) as specified in clause 2.10.1 of 3GPP TS 23.003.
  It is encoded as a string of 3 hexadecimal characters where the first character is limited
  to values 0 to 3 (i.e. 10 bits).

```

**RfspIndex:**

```

type: integer
minimum: 1
maximum: 256
description: >
  Unsigned integer representing the "Subscriber Profile ID for RAT/Frequency Priority"
  as specified in 3GPP TS 36.413.

```

**RfspIndexRm:**

```

type: integer
minimum: 1
maximum: 256
nullable: true
description: >
  Unsigned integer representing the 'Subscriber Profile ID for RAT/Frequency Priority'
  as specified in 3GPP TS 36.413 with the OpenAPI 'nullable: true' property.

```

**NfGroupId:**

```

type: string
description: Identifier of a group of NFs.

```

**MtcProviderInformation:**

```

type: string
description: String uniquely identifying MTC provider information.

```

**CagId:**

```

type: string
pattern: '^([A-Fa-f0-9]{8})$$'
description: String containing a Closed Access Group Identifier.

```

```

SupiOrSuci:
  type: string
  pattern: '^(imsi-[0-9]{5,15}|nai-.+|gli-.+|gci-.+|suci-(0-[0-9]{3}-[0-9]{2,3}|[1-7]-.+)-[0-9]{1,4}-(0-0-.*|[a-fA-F1-9]-([1-9]|[1-9][0-9]|1[0-9]{2}|2[0-4][0-9]|25[0-5])-[a-fA-F0-9]+)|.+)$$'
  description: String identifying a SUPI or a SUCI.

Imsi:
  description: String identifying an IMSI
  type: string
  pattern: '^[0-9]{5,15}$'

ApplicationlayerId:
  type: string
  description: >
    String identifying an UE with application layer ID. The format of the application
    layer ID parameter is same as the Application layer ID defined in clause 11.3.4 of
    3GPP TS 24.554.

NsacSai:
  type: string
  description: >
    String identifying the Network Slice Admission Control Service Area Identifier.

#
# ENUMERATED DATA TYPES
#

GroupServiceId:
  anyOf:
    - type: integer
      enum:
        - 1
        - 2
        - 3
    - type: integer
      description: >
        This integer provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.
  description: |
    Possible values are:
    - 1: Group specific NAS level congestion control
    - 2: Group specific Monitoring of Number of UEs present in a geographical area
    - 3: Group specific Group specific for 5G LAN Type service

#
# STRUCTURED DATA TYPES
#

Guami:
  type: object
  properties:
    plmnId:
      $ref: '#/components/schemas/PlmnIdNid'
    amfId:
      $ref: '#/components/schemas/AmfId'
  required:
    - plmnId
    - amfId
  description: Globally Unique AMF Identifier constructed out of PLMN, Network and AMF identity.

GuamiRm:
  anyOf:
    - $ref: '#/components/schemas/Guami'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'Guami' data type, but with the OpenAPI
    'nullable: true' property.

NetworkId:
  type: object
  properties:
    mnc:
      $ref: '#/components/schemas/Mnc'
    mcc:
      $ref: '#/components/schemas/Mcc'
  description: contains PLMN and Network identity.

```

```
#
# Data Types related to 5G Network as defined in clause 5.4
#
#
# SIMPLE DATA TYPES
#
ApplicationId:
  type: string
  description: String providing an application identifier.
ApplicationIdRm:
  type: string
  nullable: true
  description: >
    String providing an application identifier with the OpenAPI 'nullable: true' property.

PduSessionId:
  type: integer
  minimum: 0
  maximum: 255
  description: >
    Unsigned integer identifying a PDU session, within the range 0 to 255, as specified in
    clause 11.2.3.1b, bits 1 to 8, of 3GPP TS 24.007. If the PDU Session ID is allocated by the
    Core Network for UEs not supporting N1 mode, reserved range 64 to 95 is used. PDU Session ID
    within the reserved range is only visible in the Core Network.

Mcc:
  type: string
  pattern: '^d{3}$'
  description: >
    Mobile Country Code part of the PLMN, comprising 3 digits, as defined in clause 9.3.3.5
    of 3GPP TS 38.413.

MccRm:
  type: string
  pattern: '^d{3}$'
  nullable: true
  description: >
    Mobile Country Code part of the PLMN, comprising 3 digits, as defined in clause 9.3.3.5 of
    3GPP TS 38.413 with the OpenAPI 'nullable: true' property.

Mnc:
  type: string
  pattern: '^d{2,3}$'
  description: >
    Mobile Network Code part of the PLMN, comprising 2 or 3 digits, as defined in
    clause 9.3.3.5 of 3GPP TS 38.413.

MncRm:
  type: string
  pattern: '^d{2,3}$'
  nullable: true
  description: >
    Mobile Network Code part of the PLMN, comprising 2 or 3 digits, as defined in clause
    9.3.3.5 of 3GPP TS 38.413 with the OpenAPI 'nullable: true' property.

Tac:
  type: string
  pattern: '^[A-Fa-f0-9]{4}$|^[A-Fa-f0-9]{6}$'
  description: >
    2 or 3-octet string identifying a tracking area code as specified in clause 9.3.3.16 or
    9.3.3.10 of 3GPP TS 38.413, in hexadecimal representation. Each character in the string
    shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits.
    The most significant character representing the 4 most significant bits of the TAC shall
    appear first in the string, and the character representing the 4 least significant bit
    of the TAC shall appear last in the string.

TacRm:
  type: string
  pattern: '^[A-Fa-f0-9]{4}$|^[A-Fa-f0-9]{6}$'
  nullable: true
  description: >
    This data type is defined in the same way as the 'Tac' data type, but with the
    OpenAPI 'nullable: true' property.

EutraCellId:
  type: string
```

pattern: '^[A-Fa-f0-9]{7}\$'

description: >

28-bit string identifying an E-UTRA Cell Id as specified in clause 9.3.1.9 of 3GPP TS 38.413, in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the Cell Id shall appear first in the string, and the character representing the 4 least significant bit of the Cell Id shall appear last in the string.

EutraCellIdRm:

type: string

pattern: '^[A-Fa-f0-9]{7}\$'

nullable: true

description: >

This data type is defined in the same way as the 'EutraCellId' data type, but with the OpenAPI 'nullable: true' property.

NrCellId:

type: string

pattern: '^[A-Fa-f0-9]{9}\$'

description: >

36-bit string identifying an NR Cell Id as specified in clause 9.3.1.7 of 3GPP TS 38.413, in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the Cell Id shall appear first in the string, and the character representing the 4 least significant bit of the Cell Id shall appear last in the string.

NrCellIdRm:

type: string

pattern: '^[A-Fa-f0-9]{9}\$'

nullable: true

description: >

This data type is defined in the same way as the 'NrCellId' data type, but with the OpenAPI 'nullable: true' property.

Dnai:

type: string

description: DNAI (Data network access identifier), see clause 5.6.7 of 3GPP TS 23.501.

DnaiRm:

type: string

nullable: true

description: >

This data type is defined in the same way as the 'Dnai' data type, but with the OpenAPI 'nullable: true' property.

5GmCause:

\$ref: '#/components/schemas/UInteger'

AmfName:

\$ref: '#/components/schemas/Fqdn'

AreaCode:

type: string

description: Values are operator specific.

AreaCodeRm:

type: string

nullable: true

description: >

This data type is defined in the same way as the 'AreaCode' data type, but with the OpenAPI 'nullable: true' property.

N3IwfId:

type: string

pattern: '^[A-Fa-f0-9]+\$'

description: >

This represents the identifier of the N3IWF ID as specified in clause 9.3.1.57 of 3GPP TS 38.413 in hexadecimal representation. Each character in the string shall take a

value

of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the N3IWF ID shall appear first in the string, and the character representing the 4 least significant bit of the N3IWF ID shall appear last in the string.

WAgfId:

type: string

pattern: '^[A-Fa-f0-9]+\$'

description: >

This represents the identifier of the W-AGF ID as specified in clause 9.3.1.162 of 3GPP TS 38.413 in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the W-AGF ID shall appear first in the string, and the character representing the 4 least significant bit of the W-AGF ID shall appear last in the string.

TngfId:

type: string  
pattern: '^[A-Fa-f0-9]+\$'  
description: >

This represents the identifier of the TNGF ID as specified in clause 9.3.1.161 of 3GPP TS 38.413 in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the TNGF ID shall appear first in the string, and the character representing the 4 least significant bit of the TNGF ID shall appear last in the string.

NgeNbID:

type: string  
pattern: '(MacroNGeNB-[A-Fa-f0-9]{5}|LMacroNGeNB-[A-Fa-f0-9]{6}|SMacroNGeNB-[A-Fa-f0-9]{5})\$'  
description: >

This represents the identifier of the ng-eNB ID as specified in clause 9.3.1.8 of 3GPP TS 38.413. The value of the ng-eNB ID shall be encoded in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The padding 0 shall be added to make multiple nibbles, so the most significant character representing the padding 0 if required together with the 4 most significant bits of the ng-eNB ID shall appear first in the string, and the character representing the 4 least significant bit of the ng-eNB ID (to form a nibble) shall appear last in the string.

example: SMacroNGeNB-34B89

Nid:

type: string  
pattern: '^[A-Fa-f0-9]{11}\$'  
description: >

This represents the Network Identifier, which together with a PLMN ID is used to identify an SNPN (see 3GPP TS 23.003 and 3GPP TS 23.501 clause 5.30.2.1).

NidRm:

type: string  
pattern: '^[A-Fa-f0-9]{11}\$'  
nullable: true  
description: >

This data type is defined in the same way as the 'Nid' data type, but with the OpenAPI 'nullable: true' property."

NfSetId:

type: string  
description: >  
NF Set Identifier (see clause 28.12 of 3GPP TS 23.003), formatted as the following string "set<Set ID>.<nftype>set.5gc.mnc<MNC>.mcc<MCC>", or "set<SetID>.<NFType>set.5gc.nid<NID>.mnc<MNC>.mcc<MCC>" with <MCC> encoded as defined in clause 5.4.2 ("Mcc" data type definition) <MNC> encoding the Mobile Network Code part of the PLMN, comprising 3 digits. If there are only 2 significant digits in the MNC, one "0" digit shall be inserted at the left side to fill the 3 digits coding of MNC. Pattern: '^[0-9]{3}\$' <NFType> encoded as a value defined in Table 6.1.6.3.3-1 of 3GPP TS 29.510 but with lower case characters <Set ID> encoded as a string of characters consisting of alphabetic characters (A-Z and a-z), digits (0-9) and/or the hyphen (-) and that shall end with either an alphabetic character or a digit.

NfServiceSetId:

type: string  
description: >  
NF Service Set Identifier (see clause 28.12 of 3GPP TS 23.003) formatted as the following string "set<Set ID>.sn<Service Name>.nfi<NF Instance ID>.5gc.mnc<MNC>.mcc<MCC>", or "set<SetID>.sn<ServiceName>.nfi<NFInstanceID>.5gc.nid<NID>.mnc<MNC>.mcc<MCC>" with <MCC> encoded as defined in clause 5.4.2 ("Mcc" data type definition) <MNC> encoding the Mobile Network Code part of the PLMN, comprising 3 digits. If there are only 2 significant digits in the MNC, one "0" digit shall be inserted at the left side to fill the 3 digits coding of MNC. Pattern: '^[0-9]{3}\$' <NID> encoded as defined in clause 5.4.2 ("Nid" data type definition) <NFInstanceID> encoded as defined in clause 5.3.2 <ServiceName> encoded as defined in 3GPP TS 29.510 <Set ID> encoded as a string of characters consisting of alphabetic

characters (A-Z and a-z), digits (0-9) and/or the hyphen (-) and that shall end with either an alphabetic character or a digit.

PlmnAssiUeRadioCapId:  
\$ref: '#/components/schemas/Bytes'

ManAssiUeRadioCapId:  
\$ref: '#/components/schemas/Bytes'

TypeAllocationCode:  
type: string  
pattern: '^[0-9]{8}\$'  
description: >  
Type Allocation Code (TAC) of the UE, comprising the initial eight-digit portion of the 15-digit IMEI and 16-digit IMEISV codes. See clause 6.2 of 3GPP TS 23.003.

HfcNId:  
type: string  
maxLength: 6  
description: >  
This IE represents the identifier of the HFC node Id as specified in CableLabs WR-TR-5WWC-ARCH. It is provisioned by the wireline operator as part of wireline operations and may contain up to six characters.

HfcNIdRm:  
type: string  
maxLength: 6  
nullable: true  
description: >  
This data type is defined in the same way as the 'HfcNId' data type, but with the OpenAPI 'nullable: true' property.

ENbId:  
type: string  
pattern: '^(MacroeNB-[A-Fa-f0-9]{5}|LMacroeNB-[A-Fa-f0-9]{6}|SMacroeNB-[A-Fa-f0-9]{5}|HomeeNB-[A-Fa-f0-9]{7})\$'  
description: >  
This represents the identifier of the eNB ID as specified in clause 9.2.1.37 of 3GPP TS 36.413. The string shall be formatted with the following pattern '^(MacroeNB-[A-Fa-f0-9]{5}|LMacroeNB-[A-Fa-f0-9]{6}|SMacroeNB-[A-Fa-f0-9]{5}|HomeeNB-[A-Fa-f0-9]{7})\$'. The value of the eNB ID shall be encoded in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The padding 0 shall be added to make multiple nibbles, so the most significant character representing the padding 0 if required together with the 4 most significant bits of the eNB ID shall appear first in the string, and the character representing the 4 least significant bit of the eNB ID (to form a nibble) shall appear last in the string.

Gli:  
\$ref: '#/components/schemas/Bytes'

Gci:  
type: string  
description: >  
Global Cable Identifier uniquely identifying the connection between the 5G-CRG or FN-CRG to the 5GS. See clause 28.15.4 of 3GPP TS 23.003. This shall be encoded as a string per clause 28.15.4 of 3GPP TS 23.003, and compliant with the syntax specified in clause 2.2 of IETF RFC 7542 for the username part of a NAI. The GCI value is specified in CableLabs WR-TR-5WWC-ARCH.

NsSrg:  
type: string  
description: >  
String providing a Network Slice Simultaneous Registration Group. See clause 5.15.12 of 3GPP TS 23.501

NsSrgRm:  
type: string  
nullable: true  
description: >  
String providing a Network Slice Simultaneous Registration Group with the OpenAPI "nullable: true" property. See clause 5.15.12 of 3GPP TS 23.501

RelayServiceCode:  
type: integer  
minimum: 0  
maximum: 16777215  
description: >

Relay Service Code to identify a connectivity service provided by the UE-to-Network relay or the UE-to-UE relay.

5GPrukId:

type: string

description: >

A string carrying the CP-PRUK ID of the 5G ProSe Remote UE or the 5G ProSe End UE.

The CP-PRUK ID is a string in NAI format as specified in clause 28.7.11 of 3GPP TS 23.003.

pattern: '^rid[0-9]{1,4}\.pid[0-9a-fA-F]+\@prose-cp\.5gc\.mnc[0-9]{2,3}\.mcc[0-9]{3}\.3gppnetwork\.org\$'

NsagId:

type: integer

description: >

The Network Slice AS Group ID, see 3GPP TS 38.413

NsagIdRm:

type: integer

nullable: true

description: >

This data type is defined in the same way as the "NsagId" data type, but with the OpenAPI "nullable: true" property

GeoSatelliteId:

type: string

description: >

A string carrying the GEO Satellite ID.

OffloadIdentifier:

type: string

description: >

Offload identifier uniquely identifying a VPLMN offloading policy information instance

pattern: '^([0-9]{3}-[0-9]{2,3}-[A-Fa-f0-9]{8})(-[v0-9]{1,2}){0,1}\$'

OpConfiguredCapability:

type: string

description: >

The operator configurable capability supported by the UPF.

SatelliteId:

type: string

description: >

Unique identifier of a satellite.

EnergySavingIndicator:

\$ref: '#/components/schemas/UInteger'

OverloadControlInfo:

description: >

String representing the Overload Control Information as defined in clause 5.2.3.2.9 of 3GPP TS 29.500.

type: string

#

# ENUMERATED DATA TYPES

#

AccessType:

type: string

enum:

- 3GPP\_ACCESS
- NON\_3GPP\_ACCESS

description: Indicates whether the access is via 3GPP or via non-3GPP.

AccessTypeRm:

anyOf:

- \$ref: '#/components/schemas/AccessType'
- \$ref: '#/components/schemas/NullValue'

description: >

Indicates whether the access is via 3GPP or via non-3GPP but with the OpenAPI 'nullable: true' property."

RatType:

anyOf:

- type: string
- enum:
- NR

- EUTRA
- WLAN
- VIRTUAL
- NBIOT
- WIRELINE
- WIRELINE\_CABLE
- WIRELINE\_BBF
- LTE-M
- NR\_U
- EUTRA\_U
- TRUSTED\_N3GA
- TRUSTED\_WLAN
- UTRA
- GERA
- NR\_LEO
- NR\_MEO
- NR\_GEO
- NR\_OTHER\_SAT
- NR\_REDCAP
- WB\_E\_UTRAN\_LEO
- WB\_E\_UTRAN\_MEO
- WB\_E\_UTRAN\_GEO
- WB\_E\_UTRAN\_OTHERSAT
- NB\_IOT\_LEO
- NB\_IOT\_MEO
- NB\_IOT\_GEO
- NB\_IOT\_OTHERSAT
- LTE\_M\_LEO
- LTE\_M\_MEO
- LTE\_M\_GEO
- LTE\_M\_OTHERSAT
- NR\_EREDCAP
- HSPA\_EVOLUTION - type: string

description: Indicates the radio access used.

## RatTypeRm:

anyOf:

- \$ref: '#/components/schemas/RatType'
- \$ref: '#/components/schemas/NullValue'

description: >  
Provides information about the radio access but with the OpenAPI 'nullable: true' property.

## PduSessionType:

anyOf:

- type: string
- enum:
  - IPV4
  - IPV6
  - IPV4V6
  - UNSTRUCTURED
  - ETHERNET
- type: string

description: >  
PduSessionType indicates the type of a PDU session. It shall comply with the provisions defined in table 5.4.3.3-1.

## PduSessionTypeRm:

anyOf:

- \$ref: '#/components/schemas/PduSessionType'
- \$ref: '#/components/schemas/NullValue'

description: >  
PduSessionType indicates the type of a PDU session. It shall comply with the provisions defined in table 5.4.3.3-1 but with the OpenAPI "nullable: true" property.

## UpIntegrity:

anyOf:

- type: string
- enum:
  - REQUIRED
  - PREFERRED
  - NOT\_NEEDED
- type: string

description: >  
indicates whether UP integrity protection is required, preferred or not needed for all the traffic on the PDU Session. It shall comply with the provisions defined in table 5.4.3.4-1.

## UpIntegrityRm:

```

anyOf:
  - $ref: '#/components/schemas/UpIntegrity'
  - $ref: '#/components/schemas/NullValue'
description: >
  indicates whether UP integrity protection is required, preferred or not needed for all
  the traffic on the PDU Session. It shall comply with the provisions defined in
  table 5.4.3.4-1.

UpConfidentiality:
anyOf:
  - type: string
    enum:
      - REQUIRED
      - PREFERRED
      - NOT_NEEDED
  - type: string
description: >
  indicates whether UP confidentiality protection is required, preferred or not needed for
  all the traffic on the PDU Session. It shall comply with the provisions defined in
  table 5.4.3.5-1.

UpConfidentialityRm:
anyOf:
  - $ref: '#/components/schemas/UpConfidentiality'
  - $ref: '#/components/schemas/NullValue'
description: >
  indicates whether UP integrity protection is required, preferred or not needed for all the
  traffic on the PDU Session. It shall comply with the provisions defined in table 5.4.3.4-1,
  but with the OpenAPI 'nullable: true' property.

SscMode:
anyOf:
  - type: string
    enum:
      - SSC_MODE_1
      - SSC_MODE_2
      - SSC_MODE_3
  - type: string
description: >
  represents the service and session continuity mode It shall comply with the provisions
  defined in table 5.4.3.6-1.

SscModeRm:
anyOf:
  - $ref: '#/components/schemas/SscMode'
  - $ref: '#/components/schemas/NullValue'
description: >
  represents the service and session continuity mode It shall comply with the provisions
  defined in table 5.4.3.6-1 but with the OpenAPI 'nullable: true' property.

DnaiChangeType:
anyOf:
  - type: string
    enum:
      - EARLY
      - EARLY_LATE
      - LATE
  - type: string
description: >
  This string provides forward-compatibility with future extensions to the enumeration
  but is not used to encode content defined in the present version of this API.

description: |
  Possible values are:
  - EARLY: Early notification of UP path reconfiguration.
  - EARLY_LATE: Early and late notification of UP path reconfiguration. This value shall
  only be present in the subscription to the DNAI change event.
  - LATE: Late notification of UP path reconfiguration.

DnaiChangeTypeRm:
anyOf:
  - $ref: '#/components/schemas/DnaiChangeType'
  - $ref: '#/components/schemas/NullValue'
description: >
  It can take the values as specified for DnaiChangeType but with the OpenAPI
  'nullable: true' property.

RestrictionType:

```

```
anyOf:
  - type: string
    enum:
      - ALLOWED_AREAS
      - NOT_ALLOWED_AREAS
  - type: string
description: It contains the restriction type ALLOWED_AREAS or NOT_ALLOWED_AREAS.

RestrictionTypeRm:
anyOf:
  - $ref: '#/components/schemas/RestrictionType'
  - $ref: '#/components/schemas/NullValue'
description: >
  It contains the restriction type ALLOWED_AREAS or NOT_ALLOWED_AREAS but with the
  OpenAPI 'nullable: true' property.

CoreNetworkType:
anyOf:
  - type: string
    enum:
      - 5GC
      - EPC
  - type: string
description: It contains the Core Network type 5GC or EPC.

CoreNetworkTypeRm:
anyOf:
  - $ref: '#/components/schemas/CoreNetworkType'
  - $ref: '#/components/schemas/NullValue'
description: >
  It contains the Core Network type 5GC or EPC but with the OpenAPI
  'nullable: true' property.

PresenceState:
anyOf:
  - type: string
    enum:
      - IN_AREA
      - OUT_OF_AREA
      - UNKNOWN
      - INACTIVE
  - type: string
description: |
  Possible values are:
  -IN_AREA: Indicates that the UE is inside or enters the presence reporting area.
  -OUT_OF_AREA: Indicates that the UE is outside or leaves the presence reporting area
  -UNKNOWN: Indicates it is unknown whether the UE is in the presence reporting area or not
  -INACTIVE: Indicates that the presence reporting area is inactive in the serving node.

StationaryIndication:
anyOf:
  - type: string
    enum:
      - STATIONARY
      - MOBILE
  - type: string
description: >
  This string provides forward-compatibility with future
  extensions to the enumeration but is not used to encode
  content defined in the present version of this API.
description: |
  Possible values are:
  - STATIONARY: Identifies the UE is stationary
  - MOBILE: Identifies the UE is mobile

StationaryIndicationRm:
anyOf:
  - $ref: '#/components/schemas/StationaryIndication'
  - $ref: '#/components/schemas/NullValue'
description: >
  This enumeration is defined in the same way as the 'StationaryIndication' enumeration,
  but with the OpenAPI 'nullable: true' property."

ScheduledCommunicationType:
anyOf:
  - type: string
    enum:
      - DOWNLINK_ONLY
```

```

    - UPLINK_ONLY
    - BIDIRECTIONAL
  - type: string
description: |
Possible values are:
-DOWNLINK_ONLY: Downlink only
-UPLINK_ONLY: Uplink only
-BIDIRECTIONAL: Bi-directional

ScheduledCommunicationTypeRm:
  anyOf:
    - $ref: '#/components/schemas/ScheduledCommunicationType'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This enumeration is defined in the same way as the 'ScheduledCommunicationType'
    enumeration, but with the OpenAPI 'nullable: true' property."

TrafficProfile:
  anyOf:
    - type: string
      enum:
        - SINGLE_TRANS_UL
        - SINGLE_TRANS_DL
        - DUAL_TRANS_UL_FIRST
        - DUAL_TRANS_DL_FIRST
        - MULTI_TRANS
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.

description: |
Possible values are:
- SINGLE_TRANS_UL: Uplink single packet transmission.
- SINGLE_TRANS_DL: Downlink single packet transmission.
- DUAL_TRANS_UL_FIRST: Dual packet transmission, firstly uplink packet transmission
  with subsequent downlink packet transmission.
- DUAL_TRANS_DL_FIRST: Dual packet transmission, firstly downlink packet transmission
  with subsequent uplink packet transmission.

TrafficProfileRm:
  anyOf:
    - $ref: '#/components/schemas/TrafficProfile'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This enumeration is defined in the same way as the 'TrafficProfile' enumeration, but
    with the OpenAPI 'nullable: true' property.

LcsServiceAuth:
  anyOf:
    - type: string
      enum:
        - "LOCATION_ALLOWED_WITH_NOTIFICATION"
        - "LOCATION_ALLOWED_WITHOUT_NOTIFICATION"
        - "LOCATION_ALLOWED_WITHOUT_RESPONSE"
        - "LOCATION_RESTRICTED_WITHOUT_RESPONSE"
        - "NOTIFICATION_ONLY"
        - "NOTIFICATION_AND_VERIFICATION_ONLY"
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.

description: |
Possible values are:
- "LOCATION_ALLOWED_WITH_NOTIFICATION": Location allowed with notification
- "LOCATION_ALLOWED_WITHOUT_NOTIFICATION": Location allowed without notification
- "LOCATION_ALLOWED_WITHOUT_RESPONSE": Location with notification and privacy
  verification; location allowed if no response
- "LOCATION_RESTRICTED_WITHOUT_RESPONSE": Location with notification and privacy
  verification; location restricted if no response
- "NOTIFICATION_ONLY": Notification only
- "NOTIFICATION_AND_VERIFICATION_ONLY": Notification and privacy verification only

UeAuth:
  anyOf:
    - type: string
      enum:

```

```

    - AUTHORIZED
    - NOT_AUTHORIZED
  - type: string
description: |
  Possible values are:
  - AUTHORIZED: Indicates that the UE is authorized.
  - NOT_AUTHORIZED: Indicates that the UE is not authorized.

DlDataDeliveryStatus:
  anyOf:
  - type: string
    enum:
      - BUFFERED
      - TRANSMITTED
      - DISCARDED
  - type: string
    description: >
      This string provides forward-compatibility with future
      extensions to the enumeration but is not used to encode
      content defined in the present version of this API.
description: |
  Possible values are:
  - BUFFERED: The first downlink data is buffered with extended buffering matching the
    source of the downlink traffic.
  - TRANSMITTED: The first downlink data matching the source of the downlink traffic is
    transmitted after previous buffering or discarding of corresponding packet(s) because
    the UE of the PDU Session becomes ACTIVE, and buffered data can be delivered to UE.
  - DISCARDED: The first downlink data matching the source of the downlink traffic is
    discarded because the Extended Buffering time, as determined by the SMF, expires or
    the amount of downlink data to be buffered is exceeded.

DlDataDeliveryStatusRm:
  anyOf:
  - $ref: '#/components/schemas/DlDataDeliveryStatus'
  - $ref: '#/components/schemas/NullValue'
description: >
  This data type is defined in the same way as the ' DlDataDeliveryStatus ' data type,
  but with the OpenAPI 'nullable: true' property.

AuthStatus:
  anyOf:
  - type: string
    enum:
      - EAP_SUCCESS
      - EAP_FAILURE
      - PENDING
  - type: string
    description: >
      This string provides forward-compatibility with future
      extensions to the enumeration but is not used to encode
      content defined in the present version of this API.

description: |
  Possible values are:
  - "EAP_SUCCESS": The NSSAA status is EAP-Success.
  - "EAP_FAILURE": The NSSAA status is EAP-Failure.
  - "PENDING": The NSSAA status is Pending.

LineType:
  anyOf:
  - type: string
    enum:
      - DSL
      - PON
  - type: string
    description: >
      This string provides forward-compatibility with future
      extensions to the enumeration but is not used to encode
      content defined in the present version of this API.

description: |
  Possible values are:
  - DSL: Identifies a DSL line
  - PON: Identifies a PON line

LineTypeRm:
  anyOf:
  - $ref: '#/components/schemas/LineType'

```

```
- $ref: '#/components/schemas/NullValue'
description: >
  This data type is defined in the same way as the 'LineType' data type, but with the
  OpenAPI 'nullable: true' property.

NotificationFlag:
  anyOf:
  - type: string
    enum:
      - ACTIVATE
      - DEACTIVATE
      - RETRIEVAL
  - type: string
    description: >
      This string provides forward-compatibility with future
      extensions to the enumeration but is not used to encode
      content defined in the present version of this API.

  description: |
    Possible values are:
    - ACTIVATE: The event notification is activated.
    - DEACTIVATE: The event notification is deactivated and shall be muted. The available
      event(s) shall be stored.
    - RETRIEVAL: The event notification shall be sent to the NF service consumer(s),
      after that, is muted again.

TransportProtocol:
  anyOf:
  - type: string
    enum:
      - UDP
      - TCP
  - type: string
    description: >
      This string provides forward-compatibility with future
      extensions to the enumeration but is not used to encode
      content defined in the present version of this API.

  description: |
    Possible values are:
    - UDP: User Datagram Protocol.
    - TCP: Transmission Control Protocol.

SatelliteBackhaulCategory:
  anyOf:
  - type: string
    enum:
      - GEO
      - MEO
      - LEO
      - OTHER_SAT
      - DYNAMIC_GEO
      - DYNAMIC_MEO
      - DYNAMIC_LEO
      - DYNAMIC_OTHER_SAT
      - NON_SATELLITE
  - type: string
  description: Indicates the satellite backhaul used.

SatelliteBackhaulCategoryRm:
  anyOf:
  - $ref: '#/components/schemas/SatelliteBackhaulCategory'
  - $ref: '#/components/schemas/NullValue'
  description: >
    Provides information about the satellite backhaul but with the OpenAPI
    'nullable: true' property.

BufferedNotificationsAction:
  anyOf:
  - type: string
    enum:
      - SEND_ALL
      - DISCARD_ALL
      - DROP_OLD
  - type: string
```

description: >  
Indicates the required action by the event producer NF on the buffered Notifications.

## SubscriptionAction:

anyOf:  
- type: string  
enum:  
- CLOSE  
- CONTINUE\_WITH\_MUTING  
- CONTINUE\_WITHOUT\_MUTING  
- type: string  
description: >  
Indicates the required action by the event producer NF on the event subscription if an exception occurs while the event is muted.

## SnssaiStatus:

anyOf:  
- type: string  
enum:  
- AVAILABLE  
- UNAVAILABLE  
- type: string  
description: Indicates the S-NSSAI availability.

## TerminationIndication:

description: Indicates the termination of Network Slice Replacement.  
anyOf:  
- type: string  
enum:  
- NEW\_UES\_TERMINATION  
- ALL\_UES\_TERMINATION  
- type: string

## DelayMeasurementProtocol:

description: Delay measurement protocol  
anyOf:  
- type: string  
enum:  
- TWAMP  
- OWAMP  
- STAMP  
- OTHER  
- type: string

## CagProvisionOperation:

description: CAG provision operation  
anyOf:  
- type: string  
enum:  
- ADD  
- REPLACE  
- REMOVE  
- type: string

#

# STRUCTURED DATA TYPES

#

## SubscribedDefaultQos:

type: object  
required:  
- 5qi  
- arp  
properties:  
5qi:  
\$ref: '#/components/schemas/5Qi'  
arp:  
\$ref: '#/components/schemas/Arp'  
priorityLevel:  
\$ref: '#/components/schemas/5QIPriorityLevel'  
description: Provides the subscribed 5QI and the ARP, it may contain the priority level.

## Snssai:

type: object  
properties:  
sst:  
type: integer  
minimum: 0  
maximum: 255

```

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.
  Values 0 to 127 correspond to the standardized SST range. Values 128 to 255 correspond
  to the Operator-specific range. See clause 28.4.2 of 3GPP TS 23.003.
  Standardized values are defined in clause 5.15.2.2 of 3GPP TS 23.501.

sd:
  type: string
  pattern: '^[A-Fa-f0-9]{6}$'
  description: >
    3-octet string, representing the Slice Differentiator, in hexadecimal representation.
    Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F"
    and shall represent 4 bits. The most significant character representing the 4 most
    significant bits of the SD shall appear first in the string, and the character
    representing the 4 least significant bit of the SD shall appear last in the string.
    This is an optional parameter that complements the Slice/Service type(s) to allow to
    differentiate amongst multiple Network Slices of the same Slice/Service type. This IE
    shall be absent if no SD value is associated with the SST.
description: >
  When Sns sai needs to be converted to string (e.g. when used in maps as key), the string
shall
  be composed of one to three digits "sst" optionally followed by "-" and 6 hexadecimal digits
  "sd".

required:
  - sst

PlmnId:
  type: object
  properties:
    mcc:
      $ref: '#/components/schemas/Mcc'
    mnc:
      $ref: '#/components/schemas/Mnc'
  description: >
    When PlmnId needs to be converted to string (e.g. when used in maps as key), the string
    shall be composed of three digits "mcc" followed by "-" and two or three digits "mnc".

required:
  - mcc
  - mnc
PlmnIdRm:
  anyOf:
    - $ref: '#/components/schemas/PlmnId'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'PlmnId' data type, but with the
    OpenAPI 'nullable: true' property.

Tai:
  description: Contains the tracking area identity as described in 3GPP 23.003
  type: object
  properties:
    plmnId:
      $ref: '#/components/schemas/PlmnId'
    tac:
      $ref: '#/components/schemas/Tac'
    nid:
      $ref: '#/components/schemas/Nid'
  required:
    - plmnId
    - tac

TaiRm:
  anyOf:
    - $ref: '#/components/schemas/Tai'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'Tai' data type, but with the OpenAPI
    'nullable: true' property.

Ecgi:
  description: Contains the ECGI (E-UTRAN Cell Global Identity), as described in 3GPP 23.003
  type: object
  properties:
    plmnId:
      $ref: '#/components/schemas/PlmnId'

```

```

    eutraCellId:
      $ref: '#/components/schemas/EutraCellId'
    nid:
      $ref: '#/components/schemas/Nid'
  required:
  - plmnId
  - eutraCellId

EcgiRm:
  anyOf:
  - $ref: '#/components/schemas/Ecgi'
  - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'Ecgi' data type, but with the
    OpenAPI 'nullable: true' property.

Ncgi:
  description: Contains the NCGI (NR Cell Global Identity), as described in 3GPP 23.003
  type: object
  properties:
    plmnId:
      $ref: '#/components/schemas/PlmnId'
    nrCellId:
      $ref: '#/components/schemas/NrCellId'
    nid:
      $ref: '#/components/schemas/Nid'
  required:
  - plmnId
  - nrCellId

NcgiRm:
  anyOf:
  - $ref: '#/components/schemas/Ncgi'
  - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'Ncgi' data type, but with the
    OpenAPI 'nullable: true' property.

UserLocation:
  type: object
  properties:
    eutraLocation:
      $ref: '#/components/schemas/EutraLocation'
    nrLocation:
      $ref: '#/components/schemas/NrLocation'
    n3gaLocation:
      $ref: '#/components/schemas/N3gaLocation'
    utraLocation:
      $ref: '#/components/schemas/UtraLocation'
    geraLocation:
      $ref: '#/components/schemas/GeraLocation'
  description: >
    At least one of eutraLocation, nrLocation and n3gaLocation shall be present. Several
    of them may be present.

EutraLocation:
  description: Contains the E-UTRA user location.
  type: object
  properties:
    tai:
      $ref: '#/components/schemas/Tai'
    ignoreTai:
      type: boolean
      default: false
    ecgi:
      $ref: '#/components/schemas/Ecgi'
    ignoreEcgi:
      type: boolean
      default: false
    description: >
      This flag when present shall indicate that the Ecgi shall be ignored
      When present, it shall be set as follows:
      - true: ecgi shall be ignored.
      - false (default): ecgi shall not be ignored.
    ageOfLocationInformation:
      type: integer
      minimum: 0
      maximum: 32767

```

```

description: >
  The value represents the elapsed time in minutes since the last network contact of the
  mobile station. Value "0" indicates that the location information was obtained after a
  successful paging procedure for Active Location Retrieval when the UE is in idle mode
  or after a successful NG-RAN location reporting procedure with the eNB when the UE is
  in connected mode. Any other value than "0" indicates that the location information is
  the last known one. See 3GPP TS 29.002 clause 17.7.8.
ueLocationTimestamp:
  $ref: '#/components/schemas/DateTime'
geographicalInformation:
  type: string
  pattern: '^[0-9A-F]{16}$'
  description: >
    Refer to geographical Information. See 3GPP TS 23.032 clause 7.3.2. Only the
    description of an ellipsoid point with uncertainty circle is allowed to be used.
geodeticInformation:
  type: string
  pattern: '^[0-9A-F]{20}$'
  description: >
    Refers to Calling Geodetic Location. See ITU-T Recommendation Q.763 (1999) [24]
    clause 3.88.2. Only the description of an ellipsoid point with uncertainty circle
    is allowed to be used.
globalNgenbId:
  $ref: '#/components/schemas/GlobalRanNodeId'

globalENbId:
  $ref: '#/components/schemas/GlobalRanNodeId'
required:
- tai
- ecgi

EutraLocationRm:
  anyOf:
  - $ref: '#/components/schemas/EutraLocation'
  - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'EutraLocation' data type, but with
    the OpenAPI 'nullable: true' property.

NrLocation:
  description: Contains the NR user location.
  type: object
  properties:
    tai:
      $ref: '#/components/schemas/Tai'
    ncgi:
      $ref: '#/components/schemas/Ncgi'
    ignoreNcgi:
      type: boolean
      default: false
    ageOfLocationInformation:
      type: integer
      minimum: 0
      maximum: 32767
    description: >
      The value represents the elapsed time in minutes since the last network contact of the
      mobile station. Value "0" indicates that the location information was obtained after a
      successful paging procedure for Active Location Retrieval when the UE is in idle mode
      or after a successful NG-RAN location reporting procedure with the eNB when the UE is
      in connected mode. Any other value than "0" indicates that the location information is
      the last known one. See 3GPP TS 29.002 clause 17.7.8.
ueLocationTimestamp:
  $ref: '#/components/schemas/DateTime'
geographicalInformation:
  type: string
  pattern: '^[0-9A-F]{16}$'
  description: >
    Refer to geographical Information. See 3GPP TS 23.032 clause 7.3.2. Only the description
    of an ellipsoid point with uncertainty circle is allowed to be used.
geodeticInformation:
  type: string
  pattern: '^[0-9A-F]{20}$'
  description: >
    Refers to Calling Geodetic Location. See ITU-T Recommendation Q.763 (1999) [24] clause
    3.88.2. Only the description of an ellipsoid point with uncertainty circle is allowed
    to be used.
globalGnbId:

```

```

    $ref: '#/components/schemas/GlobalRanNodeId'
  ntnTaiInfo:
    $ref: '#/components/schemas/NtnTaiInfo'
  required:
    - tai
    - ncgi

NrLocationRm:
  anyOf:
    - $ref: '#/components/schemas/NrLocation'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'NrLocation' data type, but with the
    OpenAPI 'nullable: true' property."

N3gaLocation:
  description: Contains the Non-3GPP access user location.
  type: object
  properties:
    n3gppTai:
      $ref: '#/components/schemas/Tai'
    n3IwfId:
      type: string
      pattern: '^[A-Fa-f0-9]+$'
      description: >
        This IE shall contain the N3IWF identifier received over NGAP and shall be encoded as a
        string of hexadecimal characters. Each character in the string shall take a value of "0"
        to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant
        character representing the 4 most significant bits of the N3IWF ID shall appear first in
        the string, and the character representing the 4 least significant bit of the N3IWF ID
        shall appear last in the string.

    ueIpv4Addr:
      $ref: '#/components/schemas/Ipv4Addr'
    ueIpv6Addr:
      $ref: '#/components/schemas/Ipv6Addr'
    portNumber:
      $ref: '#/components/schemas/UInteger'
    protocol:
      $ref: '#/components/schemas/TransportProtocol'
    tnapId:
      $ref: '#/components/schemas/TnapId'
    twapId:
      $ref: '#/components/schemas/TwapId'
    hfcNodeId:
      $ref: '#/components/schemas/HfcNodeId'
    gli:
      $ref: '#/components/schemas/Gli'
    w5gbanLineType:
      $ref: '#/components/schemas/LineType'
    gci:
      $ref: '#/components/schemas/Gci'

UpSecurity:
  description: Contains Userplain security information.
  type: object
  properties:
    upIntegr:
      $ref: '#/components/schemas/UpIntegrity'
    upConfid:
      $ref: '#/components/schemas/UpConfidentiality'
  required:
    - upIntegr
    - upConfid

UpSecurityRm:
  anyOf:
    - $ref: '#/components/schemas/UpSecurity'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'UpSecurity' data type, but with the
    OpenAPI 'nullable: true' property.

NgApCause:
  description: Represents the NGAP cause.
  type: object
  properties:
    group:

```

```

    $ref: '#/components/schemas/UInteger'
  value:
    $ref: '#/components/schemas/UInteger'
  required:
    - group
    - value

BackupAmfInfo:
  description: Provides details of the Backup AMF.
  type: object
  properties:
    backupAmf:
      $ref: '#/components/schemas/AmfName'
    guamiList:
      type: array
      items:
        $ref: '#/components/schemas/Guami'
      minItems: 1
      description: >
        If present, this IE shall contain the list of GUAMI(s) (supported by the AMF) for
        which the backupAmf IE applies.
  required:
    - backupAmf

RefToBinaryData:
  description: This parameter provides information about the referenced binary body data.
  type: object
  properties:
    contentId:
      type: string
      description: >
        This IE shall contain the value of the Content-ID header of the referenced binary
        body part.
  required:
    - contentId

RefToBinaryDataRm:
  anyOf:
    - $ref: '#/components/schemas/RefToBinaryData'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the ' RefToBinaryData ' data type,
    but with the OpenAPI 'nullable: true' property.

RouteToLocation:
  type: object
  properties:
    dnai:
      $ref: '#/components/schemas/Dnai'
    routeInfo:
      $ref: '#/components/schemas/RouteInformation'
    routeProfId:
      type: string
      nullable: true
      description: Identifies the routing profile Id.
  required:
    - dnai
  anyOf:
    - required: [ routeInfo ]
    - required: [ routeProfId ]
  nullable: true
  description: >
    At least one of the "routeInfo" attribute and the "routeProfId" attribute shall be included
    in the "RouteToLocation" data type.

RouteInformation:
  type: object
  properties:
    ipv4Addr:
      $ref: '#/components/schemas/Ipv4Addr'
    ipv6Addr:
      $ref: '#/components/schemas/Ipv6Addr'
    portNumber:
      $ref: '#/components/schemas/UInteger'
  required:
    - portNumber
  nullable: true
  description: >

```

At least one of the "ipv4Addr" attribute and the "ipv6Addr" attribute shall be included in the "RouteInformation" data type.

Area:

```
description: Provides area information.
type: object
oneOf:
  - required:
    - tacs
  - required:
    - areaCode
properties:
  tacs:
    type: array
    items:
      $ref: '#/components/schemas/Tac'
    minItems: 1
  areaCode:
    $ref: '#/components/schemas/AreaCode'
```

ServiceAreaRestriction:

```
description: Provides information about allowed or not allowed areas.
type: object
properties:
  restrictionType:
    $ref: '#/components/schemas/RestrictionType'
  areas:
    type: array
    items:
      $ref: '#/components/schemas/Area'
  maxNumOfTAs:
    $ref: '#/components/schemas/UInteger'
  maxNumOfTAsForNotAllowedAreas:
    $ref: '#/components/schemas/UInteger'
allof:
  #
  # 1st condition: restrictionType and areas attributes shall be either both absent
  #                  or both present
  #
  - oneOf:
    - not:
      required: [ restrictionType ]
    - required: [ areas ]
  #
  # 2nd condition: if restrictionType takes value NOT_ALLOWED_AREAS,
  #                  then maxNumOfTAs shall be absent
  #
  - anyOf:
    - not:
      required: [ restrictionType ]
      properties:
        restrictionType:
          type: string
          enum: [ NOT_ALLOWED_AREAS ]
    - not:
      required: [ maxNumOfTAs ]
  #
  # 3rd condition: if restrictionType takes value ALLOWED_AREAS,
  #                  then maxNumOfTAsForNotAllowedAreas shall be absent
  #
  - anyOf:
    - not:
      required: [ restrictionType ]
      properties:
        restrictionType:
          type: string
          enum: [ ALLOWED_AREAS ]
    - not:
      required: [ maxNumOfTAsForNotAllowedAreas ]
```

PresenceInfo:

```
type: object
properties:
  praId:
    type: string
    description: >
      Represents an identifier of the Presence Reporting Area (see clause 28.10 of 3GPP
      TS 23.003. This IE shall be present if the Area of Interest subscribed or reported is
```

a Presence Reporting Area or a Set of Core Network predefined Presence Reporting Areas. When present, it shall be encoded as a string representing an integer in the following ranges:

0 to 8 388 607 for UE-dedicated PRA

8 388 608 to 16 777 215 for Core Network predefined PRA

Examples:

PRA ID 123 is encoded as "123"

PRA ID 11 238 660 is encoded as "11238660"

additionalPraId:

type: string

description: >

This IE may be present if the praId IE is present and if it contains a PRA identifier referring to a set of Core Network predefined Presence Reporting Areas. When present, this IE shall contain a PRA Identifier of an individual PRA within the Set of Core Network predefined Presence Reporting Areas indicated by the praId IE.

presenceState:

\$ref: '#/components/schemas/PresenceState'

trackingAreaList:

type: array

items:

\$ref: '#/components/schemas/Tai'

minItems: 1

description: >

Represents the list of tracking areas that constitutes the area. This IE shall be present if the subscription or the event report is for tracking UE presence in the tracking areas. For non 3GPP access the TAI shall be the N3GPP TAI.

ecgiList:

type: array

items:

\$ref: '#/components/schemas/Ecgi'

minItems: 1

description: >

Represents the list of EUTRAN cell Ids that constitutes the area. This IE shall be present if the Area of Interest subscribed is a list of EUTRAN cell Ids.

ncgiList:

type: array

items:

\$ref: '#/components/schemas/Ncgi'

minItems: 1

description: >

Represents the list of NR cell Ids that constitutes the area. This IE shall be present if the Area of Interest subscribed is a list of NR cell Ids.

globalRanNodeIdList:

type: array

items:

\$ref: '#/components/schemas/GlobalRanNodeId'

minItems: 1

description: >

Represents the list of NG RAN node identifiers that constitutes the area. This IE shall be present if the Area of Interest subscribed is a list of NG RAN node identifiers.

globaleNbIdList:

type: array

items:

\$ref: '#/components/schemas/GlobalRanNodeId'

minItems: 1

description: >

Represents the list of eNodeB identifiers that constitutes the area. This IE shall be present if the Area of Interest subscribed is a list of eNodeB identifiers.

description: >

If the additionalPraId IE is present, this IE shall state the presence information of the UE for the individual PRA identified by the additionalPraId IE; If the additionalPraId IE is not present, this IE shall state the presence information of the UE for the PRA identified by the praId IE.

PresenceInfoRm:

type: object

properties:

praId:

type: string

description: |

Represents an identifier of the Presence Reporting Area (see clause 28.10 of 3GPP TS 23.003. This IE shall be present if the Area of Interest subscribed or reported is a Presence Reporting Area or a Set of Core Network predefined Presence

Reporting Areas. When present, it shall be encoded as a string representing an integer in the following ranges:

- 0 to 8 388 607 for UE-dedicated PRA
- 8 388 608 to 16 777 215 for Core Network predefined PRA

Examples:

PRA ID 123 is encoded as "123"

PRA ID 11 238 660 is encoded as "11238660"

additionalPraId:

type: string

description: >

This IE may be present if the praId IE is present and if it contains a PRA identifier referring to a set of Core Network predefined Presence Reporting Areas.

When present, this IE shall contain a PRA Identifier of an individual PRA within the Set of Core Network predefined Presence Reporting Areas indicated by the praId IE.

presenceState:

\$ref: '#/components/schemas/PresenceState'

trackingAreaList:

type: array

items:

\$ref: '#/components/schemas/Tai'

minItems: 0

description: >

Represents the list of tracking areas that constitutes the area. This IE shall be present if the subscription or the event report is for tracking UE presence in the tracking areas. For non 3GPP access the TAI shall be the N3GPP TAI.

ecgiList:

type: array

items:

\$ref: '#/components/schemas/Ecgi'

minItems: 0

description: >

Represents the list of EUTRAN cell Ids that constitutes the area. This IE shall be present if the Area of Interest subscribed is a list of EUTRAN cell Ids.

ncgiList:

type: array

items:

\$ref: '#/components/schemas/Ncgi'

minItems: 0

description: >

Represents the list of NR cell Ids that constitutes the area. This IE shall be present if the Area of Interest subscribed is a list of NR cell Ids.

globalRanNodeIdList:

type: array

items:

\$ref: '#/components/schemas/GlobalRanNodeId'

description: >

Represents the list of NG RAN node identifiers that constitutes the area. This IE shall

be

present if the Area of Interest subscribed is a list of NG RAN node identifiers.

globaleNbIdList:

type: array

items:

\$ref: '#/components/schemas/GlobalRanNodeId'

minItems: 1

description: >

Represents the list of eNodeB identifiers that constitutes the area. This IE shall be

present

if the Area of Interest subscribed is a list of eNodeB identifiers.

nullable: true

description: >

This data type is defined in the same way as the 'PresenceInfo' data type, but with the OpenAPI 'nullable: true' property. If the additionalPraId IE is present, this IE shall

state

the presence information of the UE for the individual PRA identified by the additionalPraId IE; If the additionalPraId IE is not present, this IE shall state the presence information of the UE for the PRA identified by the praId IE.

GlobalRanNodeId:

type: object

properties:

plmnId:

\$ref: '#/components/schemas/PlmnId'

n3IwfId:

\$ref: '#/components/schemas/N3IwfId'

gNbId:

\$ref: '#/components/schemas/GNbId'

```

ngeNbId:
  $ref: '#/components/schemas/NgeNbId'
wagfId:
  $ref: '#/components/schemas/WAgfId'
tngfId:
  $ref: '#/components/schemas/TngfId'
nid:
  $ref: '#/components/schemas/Nid'
eNbId:
  $ref: '#/components/schemas/ENbId'
oneOf:
  - required: [ n3IwfId ]
  - required: [ gNbId ]
  - required: [ ngeNbId ]
  - required: [ wagfId ]
  - required: [ tngfId ]
  - required: [ eNbId ]
description: >
  One of the six attributes n3IwfId, gNbIdm, ngeNbId, wagfId, tngfId, eNbId shall be present.
required:
  - plmnId
GNbId:
description: Provides the G-NB identifier.
type: object
properties:
  bitLength:
    type: integer
    minimum: 22
    maximum: 32
    description: >
      Unsigned integer representing the bit length of the gNB ID as defined in clause
      9.3.1.6 of 3GPP TS 38.413 [11], within the range 22 to 32.
  gNBValue:
    type: string
    pattern: '^[A-Fa-f0-9]{6,8}$'
    description: >
      This represents the identifier of the gNB. The value of the gNB ID shall be encoded
      in hexadecimal representation. Each character in the string shall take a value of
      "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The padding 0 shall
      be added to make multiple nibbles, the most significant character representing the
      padding 0 if required together with the 4 most significant bits of the gNB ID shall
      appear first in the string, and the character representing the 4 least significant bit
      of the gNB ID shall appear last in the string.
required:
  - bitLength
  - gNBValue
AtsssCapability:
description: >
  Contains Capability to support procedures related to Access Traffic Steering, Switching,
  Splitting.
type: object
properties:
  atsssLL:
    type: boolean
    default: false
    description: >
      Indicates the support of Access Traffic Steering, Switching and Splitting procedures
      using the ATSSS-LL steering functionality (see clauses 4.2.10, 5.32 of 3GPP TS 23.501).
      true: Supported
      false (default): Not Supported
  mptcp:
    type: boolean
    default: false
    description: >
      Indicates the support of Access Traffic Steering, Switching and Splitting procedures
      using the MPTCP steering functionality (see clauses 4.2.10, 5.32 of 3GPP TS 23.501)
      true: Supported
      false (default): Not Supported
  mpquic:
    type: boolean
    default: false
    description: >
      Indicates the support of Access Traffic Steering, Switching and Splitting procedures
      using the MPQUIC-UDP steering functionality (see clauses 4.2.10, 5.32 of 3GPP TS 23.501)
      true: Supported
      false (default): Not Supported
rttWithoutPmf:

```

```

    type: boolean
    default: false
    description: >
      This IE is only used by the UPF to indicate whether the UPF supports RTT measurement
      without PMF (see clauses 5.32.2, 6.3.3.3 of 3GPP TS 23.501
      true: Supported
      false (default): Not Supported
  mpquicIp:
    type: boolean
    default: false
    description: >
      Indicates the support of Access Traffic Steering, Switching and Splitting procedures
      using the MPQUIC-IP steering functionality (see clauses 4.2.10, 5.32 of 3GPP TS 23.501)
      true: Supported
      false (default): Not Supported
  mpquicE:
    type: boolean
    default: false
    description: >
      Indicates the support of Access Traffic Steering, Switching and Splitting procedures
      using the MPQUIC-E steering functionality (see clauses 4.2.10, 5.32 of 3GPP TS 23.501)
      true: Supported
      false (default): Not Supported
  PlmnIdNid:
    description: >
      Contains the serving core network operator PLMN ID and, for an SNPN, the NID that together
      with the PLMN ID identifies the SNPN.
    type: object
    required:
      - mcc
      - mnc
    properties:
      mcc:
        $ref: '#/components/schemas/Mcc'
      mnc:
        $ref: '#/components/schemas/Mnc'
      nid:
        $ref: '#/components/schemas/Nid'

  PlmnIdNidRm:
    anyOf:
      - $ref: '#/components/schemas/PlmnIdNid'
      - $ref: '#/components/schemas/NullValue'
    description: >
      This data type is defined in the same way as the 'PlmnIdNid' data type, but with the
      OpenAPI 'nullable: true' property.

  SmallDataRateStatus:
    description: It indicates the Small Data Rate Control Status
    type: object
    properties:
      remainPacketsUl:
        type: integer
        minimum: 0
        description: >
          When present, it shall contain the number of packets the UE is allowed to send uplink
          in the given time unit for the given PDU session (see clause 5.31.14.3 of 3GPP TS
23.501.
      remainPacketsDl:
        type: integer
        minimum: 0
        description: >
          When present it shall contain the number of packets the AF is allowed to send downlink
          in the given time unit for the given PDU session (see clause 5.31.14.3 of 3GPP TS
23.501.
      validityTime:
        $ref: '#/components/schemas/DateTime'
      remainExReportsUl:
        type: integer
        minimum: 0
        description: >
          When present, it shall indicate number of additional exception reports the UE is allowed
          to send uplink in the given time unit for the given PDU session (see clause 5.31.14.3
          of 3GPP TS 23.501.
      remainExReportsDl:
        type: integer
        minimum: 0
        description: >

```

When present, it shall indicate number of additional exception reports the AF is allowed to send downlink in the given time unit for the given PDU session (see clause 5.31.14.3 in 3GPP TS 23.501

```

HfcNodeId:
  description: REpresents the HFC Node Identifier received over NGAP.
  type: object
  required:
    - hfcNId
  properties:
    hfcNId:
      $ref: '#/components/schemas/HfcNId'

HfcNodeIdRm:
  anyOf:
    - $ref: '#/components/schemas/HfcNodeId'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'HfcNodeId' data type, but with the
    OpenAPI 'nullable: true' property.

WirelineArea:
  type: object
  properties:
    globalLineIds:
      type: array
      items:
        $ref: '#/components/schemas/Gli'
      minItems: 1
    hfcNIds:
      type: array
      items:
        $ref: '#/components/schemas/HfcNId'
      minItems: 1
    areaCodeB:
      $ref: '#/components/schemas/AreaCode'
    areaCodeC:
      $ref: '#/components/schemas/AreaCode'
    combGciAndHfcNIds:
      type: array
      items:
        $ref: '#/components/schemas/CombGciAndHfcNIds'
      minItems: 1
  description: >
    One and only one of the "globLineIds", "hfcNIds", "areaCodeB",d "areaCodeC" and
    combGciAndHfcNIds attributes shall be included in a WirelineArea data structure

WirelineServiceAreaRestriction:
  type: object
  properties:
    restrictionType:
      $ref: '#/components/schemas/RestrictionType'
    areas:
      type: array
      items:
        $ref: '#/components/schemas/WirelineArea'
  description: >
    The "restrictionType" attribute and the "areas" attribute shall be either both present
    or absent. The empty array of areas is used when service is allowed/restricted nowhere.

ApnRateStatus:
  description: Contains the APN rate control status e.g. of the AMF.
  type: object
  properties:
    remainPacketsUl:
      type: integer
      minimum: 0
      description: >
        When present, it shall contain the number of packets the UE is allowed to send uplink
        in the given time unit for the given APN (all PDN connections of the UE to this APN
        see clause 4.7.7.3 in 3GPP TS 23.401.
    remainPacketsDl:
      type: integer
      minimum: 0
      description: >
        When present, it shall contain the number of packets the UE is allowed to send uplink
        in the given time unit for the given APN (all PDN connections of the UE to this APN
        see clause 4.7.7.3 in 3GPP TS 23.401.

```

```

validityTime:
  $ref: '#/components/schemas/DateTime'
remainExReportsUl:
  type: integer
  minimum: 0
  description: >
    When present, it shall indicate the number of additional exception reports the UE is
    allowed to send uplink in the given time unit for the given APN (all PDN connections of
the UE to this APN,
    see clause 4.7.7.3 in 3GPP TS 23.401.
remainExReportsDl:
  type: integer
  minimum: 0
  description: >
    When present, it shall indicate the number of additional exception reports the AF is
    allowed to send downlink in the given time unit for the given APN (all PDN connections
    of the UE to this APN, see clause 4.7.7.3 in 3GPP TS 23.401.

ScheduledCommunicationTime:
  description: Identifies time and day of the week when the UE is available for communication.
  type: object
  properties:
    daysOfWeek:
      type: array
      items:
        $ref: '#/components/schemas/DayOfWeek'
      minItems: 1
      maxItems: 6
      description: >
        Identifies the day(s) of the week. If absent, it indicates every day of the week.
    timeOfDayStart:
      $ref: '#/components/schemas/TimeOfDay'
    timeOfDayEnd:
      $ref: '#/components/schemas/TimeOfDay'

ScheduledCommunicationTimeRm:
  anyOf:
    - $ref: '#/components/schemas/ScheduledCommunicationTime'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'ScheduledCommunicationTime' data type,
    but with the OpenAPI 'nullable: true' property.

BatteryIndication:
  type: object
  properties:
    batteryInd:
      type: boolean
      description: >
        This IE shall indicate whether the UE is battery powered or not.
        true: the UE is battery powered;
        false or absent: the UE is not battery powered
    replaceableInd:
      type: boolean
      description: >
        This IE shall indicate whether the battery of the UE is replaceable or not.
        true: the battery of the UE is replaceable;
        false or absent: the battery of the UE is not replaceable.
    rechargeableInd:
      type: boolean
      description: >
        This IE shall indicate whether the battery of the UE is rechargeable or not.
        true: the battery of UE is rechargeable;
        false or absent: the battery of the UE is not rechargeable.
  description: >
    Parameters "replaceableInd" and "rechargeableInd" are only included if the value of
    Parameter "batteryInd" is true.

BatteryIndicationRm:
  anyOf:
    - $ref: '#/components/schemas/BatteryIndication'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'BatteryIndication' data type, but
    with the OpenAPI 'nullable: true' property.

AcsInfo:
  description: The ACS information for the 5G-RG is defined in BBF TR-069 [42] or in BBF TR-369

```

```

type: object
properties:
  acsUrl:
    $ref: '#/components/schemas/Uri'
  acsIpv4Addr:
    $ref: '#/components/schemas/Ipv4Addr'
  acsIpv6Addr:
    $ref: '#/components/schemas/Ipv6Addr'

AcsInfoRm:
  anyOf:
    - $ref: '#/components/schemas/AcsInfo'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'AcsInfo' data type, but with the
    OpenAPI 'nullable: true' property.

NrV2xAuth:
  description: Contains NR V2X services authorized information.
  type: object
  properties:
    vehicleUeAuth:
      $ref: '#/components/schemas/UeAuth'
    pedestrianUeAuth:
      $ref: '#/components/schemas/UeAuth'

LteV2xAuth:
  description: Contains LTE V2X services authorized information.
  type: object
  properties:
    vehicleUeAuth:
      $ref: '#/components/schemas/UeAuth'
    pedestrianUeAuth:
      $ref: '#/components/schemas/UeAuth'

Pc5QoSPara:
  description: Contains policy data on the PC5 QoS parameters.
  type: object
  required:
    - pc5QosFlowList
  properties:
    pc5QosFlowList:
      type: array
      items:
        $ref: '#/components/schemas/Pc5QosFlowItem'
      minItems: 1
    pc5LinkAmbr:
      $ref: '#/components/schemas/BitRate'

Pc5QosFlowItem:
  description: Contains a PC5 QOS flow.
  type: object
  required:
    - pqi
  properties:
    pqi:
      $ref: '#/components/schemas/5Qi'

    pc5FlowBitRates:
      $ref: '#/components/schemas/Pc5FlowBitRates'
    range:
      $ref: '#/components/schemas/UInteger'

Pc5FlowBitRates:
  description: it shall represent the PC5 Flow Bit Rates
  type: object
  properties:
    guaFbr:
      $ref: '#/components/schemas/BitRate'
    maxFbr:
      $ref: '#/components/schemas/BitRate'

UltraLocation:
  type: object
  oneOf:
    - required:
      - cgi
    - required:

```

```

- sai
- required:
- rai
description: Exactly one of cgi, sai or lai shall be present.
properties:
  cgi:
    $ref: '#/components/schemas/CellGlobalId'
  sai:
    $ref: '#/components/schemas/ServiceAreaId'
  lai:
    $ref: '#/components/schemas/LocationAreaId'
  rai:
    $ref: '#/components/schemas/RoutingAreaId'
  ageOfLocationInformation:
    type: integer
    minimum: 0
    maximum: 32767
    description: >
      The value represents the elapsed time in minutes since the last network contact of the
      mobile station. Value "0" indicates that the location information was obtained after a
      successful paging procedure for Active Location Retrieval when the UE is in idle mode
      or after a successful location reporting procedure the UE is in connected mode. Any
      other value than "0" indicates that the location information is the last known one.
      See 3GPP TS 29.002 clause 17.7.8.
  ueLocationTimestamp:
    $ref: '#/components/schemas/DateTime'
  geographicalInformation:
    type: string
    pattern: '^([0-9A-F]{16})$'
    description: >
      Refer to geographical Information. See 3GPP TS 23.032 clause 7.3.2. Only the
      description of an ellipsoid point with uncertainty circle is allowed to be used.
  geodeticInformation:
    type: string
    pattern: '^([0-9A-F]{20})$'
    description: >
      Refers to Calling Geodetic Location. See ITU-T Recommendation Q.763 (1999) clause
      3.88.2. Only the description of an ellipsoid point with uncertainty circle is allowed
      to be used.

GeraLocation:
  type: object
  oneOf:
    - required:
      - cgi
    - required:
      - sai
    - required:
      - lai
description: Exactly one of cgi, sai or lai shall be present.
properties:
  locationNumber:
    type: string
    description: Location number within the PLMN. See 3GPP TS 23.003, clause 4.5.
  cgi:
    $ref: '#/components/schemas/CellGlobalId'
  sai:
    $ref: '#/components/schemas/ServiceAreaId'
  lai:
    $ref: '#/components/schemas/LocationAreaId'
  rai:
    $ref: '#/components/schemas/RoutingAreaId'
  vlrNumber:
    type: string
    description: VLR number. See 3GPP TS 23.003 clause 5.1.
  mscNumber:
    type: string
    description: MSC number. See 3GPP TS 23.003 clause 5.1.
  ageOfLocationInformation:
    type: integer
    minimum: 0
    maximum: 32767
    description: >
      The value represents the elapsed time in minutes since the last network contact of the
      mobile station. Value "0" indicates that the location information was obtained after a
      successful paging procedure for Active Location Retrieval when the UE is in idle mode
      or after a successful location reporting procedure the UE is in connected mode. Any
      other value than "0" indicates that the location information is the last known one.

```

See 3GPP TS 29.002 clause 17.7.8.

ueLocationTimestamp:  
\$ref: '#/components/schemas/DateTime'  
geographicalInformation:  
type: string  
pattern: '^[0-9A-F]{16}\$'  
description: >  
Refer to geographical Information. See 3GPP TS 23.032 clause 7.3.2. Only the description of an ellipsoid point with uncertainty circle is allowed to be used.

geodeticInformation:  
type: string  
pattern: '^[0-9A-F]{20}\$'  
description: >  
Refers to Calling Geodetic Location. See ITU-T Recommendation Q.763 (1999) clause 3.88.2. Only the description of an ellipsoid point with uncertainty circle is allowed to be used.

CellGlobalId:  
description: Contains a Cell Global Identification as defined in 3GPP TS 23.003, clause 4.3.1.  
type: object  
required:  
- plmnId  
- lac  
- cellId  
properties:  
plmnId:  
\$ref: '#/components/schemas/PlmnId'  
lac:  
type: string  
pattern: '^[A-Fa-f0-9]{4}\$'  
cellId:  
type: string  
pattern: '^[A-Fa-f0-9]{4}\$'

ServiceAreaId:  
description: Contains a Service Area Identifier as defined in 3GPP TS 23.003, clause 12.5.  
type: object  
required:  
- plmnId  
- lac  
- sac  
properties:  
plmnId:  
\$ref: '#/components/schemas/PlmnId'  
lac:  
type: string  
pattern: '^[A-Fa-f0-9]{4}\$'  
description: Location Area Code.  
sac:  
type: string  
pattern: '^[A-Fa-f0-9]{4}\$'  
description: Service Area Code.

LocationAreaId:  
description: Contains a Location area identification as defined in 3GPP TS 23.003, clause 4.1.  
type: object  
required:  
- plmnId  
- lac  
properties:  
plmnId:  
\$ref: '#/components/schemas/PlmnId'  
lac:  
type: string  
pattern: '^[A-Fa-f0-9]{4}\$'  
description: Location Area Code.

RoutingAreaId:  
description: Contains a Routing Area Identification as defined in 3GPP TS 23.003, clause 4.2.  
type: object  
required:  
- plmnId  
- lac  
- rac  
properties:  
plmnId:  
\$ref: '#/components/schemas/PlmnId'

```

lac:
  type: string
  pattern: '^[A-Fa-f0-9]{4}$'
  description: Location Area Code
rac:
  type: string
  pattern: '^[A-Fa-f0-9]{2}$'
  description: Routing Area Code

DddTrafficDescriptor:
  description: Contains a Traffic Descriptor.
  type: object
  properties:
    ipv4Addr:
      $ref: '#/components/schemas/Ipv4Addr'
    ipv6Addr:
      $ref: '#/components/schemas/Ipv6Addr'
    portNumber:
      $ref: '#/components/schemas/UInteger'
    macAddr:
      $ref: '#/components/schemas/MacAddr48'

MoExpDataCounter:
  description: Contain the MO Exception Data Counter.
  type: object
  required:
    - counter
  properties:
    counter:
      type: integer
      description: >
        Unsigned integer identifying the MO Exception Data Counter, as specified in clause
        5.31.14.3 of 3GPP TS 23.501.
    timeStamp:
      $ref: '#/components/schemas/DateTime'

NssaaStatus:
  description: contains the Subscribed S-NSSAI subject to NSSAA procedure and the status.
  type: object
  required:
    - snssai
    - status
  properties:
    snssai:
      $ref: '#/components/schemas/Snssai'
    status:
      $ref: '#/components/schemas/AuthStatus'

NssaaStatusRm:
  anyOf:
    - $ref: '#/components/schemas/NssaaStatus'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'NssaaStatus' data type, but with
    the OpenAPI 'nullable: true' property.

TnapId:
  description: Contain the TNAP Identifier see clause 5.6.2 of 3GPP TS 23.501.
  type: object
  properties:
    ssid:
      type: string
      description: >
        This IE shall be present if the UE is accessing the 5GC via a trusted WLAN access
        network. When present, it shall contain the SSID of the access point to which the UE
        is attached, that is received over NGAP, see IEEE Std 802.11-2012.

    bssid:
      type: string
      description: >
        When present, it shall contain the BSSID of the access point to which the UE is
        attached, that is received over NGAP, see IEEE Std 802.11-2012.

    civicAddress:
      $ref: '#/components/schemas/Bytes'

TnapIdRm:
  anyOf:

```

```

- $ref: '#/components/schemas/TnapId'
- $ref: '#/components/schemas/NullValue'
description: >
  This data type is defined in the same way as the 'TnapId' data type, but with the
  OpenAPI 'nullable: true' property.

TwapId:
description: >
  Contain the TWAP Identifier as defined in clause 4.2.8.5.3 of 3GPP TS 23.501
  or the WLAN location information as defined in clause 4.5.7.2.8 of 3GPP TS 23.402.
type: object
required:
- ssId
properties:
  ssId:
    type: string
    description: >
      This IE shall contain the SSID of the access point to which the UE is attached, that is
      received over NGAP, see IEEE Std 802.11-2012.

  bssid:
    type: string
    description: >
      When present, it shall contain the BSSID of the access point to which the UE is
      attached, for trusted WLAN access, see IEEE Std 802.11-2012.

  civicAddress:
    $ref: '#/components/schemas/Bytes'

TwapIdRm:
anyOf:
- $ref: '#/components/schemas/TwapId'
- $ref: '#/components/schemas/NullValue'
description: >
  This data type is defined in the same way as the 'TwapId' data type, but with the
  OpenAPI 'nullable: true' property.

SnssaiExtension:
description: >
  Extensions to the Snssai data type, sdRanges and wildcardSd shall not be present
  simultaneously
type: object
not:
  required:
  - sdRanges
  - wildcardSd
properties:
  sdRanges:
    description: >
      When present, it shall contain the range(s) of Slice Differentiator values supported for
      the Slice/Service Type value indicated in the sst attribute of the Snssai data type
    type: array
    items:
      $ref: '#/components/schemas/SdRange'
    minItems: 1
  wildcardSd:
    description: >
      When present, it shall be set to true, to indicate that all SD values are supported for
      the Slice/Service Type value indicated in the sst attribute of the Snssai data type.
    type: boolean
    enum:
    - true

SdRange:
description: A range of SDs (Slice Differentiators)
type: object
properties:
  start:
    type: string
    pattern: '^[A-Fa-f0-9]{6}$'
    description: >
      First value identifying the start of an SD range. This string shall be formatted as
      specified for the sd attribute of the Snssai data type in clause 5.4.4.2.
  end:
    type: string
    pattern: '^[A-Fa-f0-9]{6}$'
    description: >
      Last value identifying the end of an SD range. This string shall be formatted as

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specified for the sd attribute of the Snssai data type in clause 5.4.4.2.

```

ProseServiceAuth:
  description: >
    Indicates whether the UE is authorized to use related services.
  type: object
  properties:
    proseDirectDiscoveryAuth:
      $ref: '#/components/schemas/UeAuth'
    proseDirectCommunicationAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL2RelayAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL3RelayAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL2RemoteAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL3RemoteAuth:
      $ref: '#/components/schemas/UeAuth'
    proseMultipathComL2RemoteAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL2UeRelayAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL3UeRelayAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL2EndAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL3EndAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL3IntermediateRelayAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL3RemoteMultihopAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL3RelayMultihopAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL3UeRelayMultihopAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL3EndMultihopAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL2IntermediateRelayAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL2RemoteMultihopAuth:
      $ref: '#/components/schemas/UeAuth'
    proseL2RelayMultihopAuth:
      $ref: '#/components/schemas/UeAuth'

EcsServerAddr:
  description: >
    Contains the Edge Configuration Server Address Configuration Information as defined in
    clause 5.2.3.6.1 of 3GPP TS 23.502.
  type: object
  properties:
    ecsFqdnList:
      type: array
      items:
        $ref: '#/components/schemas/Fqdn'
      minItems: 1
    ecsIpAddressList:
      type: array
      items:
        $ref: '#/components/schemas/IpAddr'
      minItems: 1
    ecsUriList:
      type: array
      items:
        $ref: '#/components/schemas/Uri'
      minItems: 1
    ecsProviderID:
      type: string

EcsServerAddrRm:
  anyOf:
    - $ref: '#/components/schemas/EcsServerAddr'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the ' EcsServerAddr ' data type, but with
    the OpenAPI 'nullable: true' property.

```

```

IpAddr:
  description: Contains an IP adresse.
  type: object
  oneOf:
    - required:
      - ipv4Addr
    - required:
      - ipv6Addr
    - required:
      - ipv6Prefix
  properties:
    ipv4Addr:
      $ref: '#/components/schemas/Ipv4Addr'
    ipv6Addr:
      $ref: '#/components/schemas/Ipv6Addr'
    ipv6Prefix:
      $ref: '#/components/schemas/Ipv6Prefix'

SACInfo:
  description: >
    Represents threshold(s) to control the triggering of network slice reporting notifications
    or the information contained in the network slice reporting notification.
  type: object
  properties:
    numericValNumUes:
      type: integer
    numericValNumPduSess:
      type: integer
    percValueNumUes:
      type: integer
      minimum: 0
      maximum: 100
    percValueNumPduSess:
      type: integer
      minimum: 0
      maximum: 100
    uesWithPduSessionInd:
      type: boolean
      default: false

SACEventStatus:
  description: >
    Contains the network slice status information in terms of the current number of UEs
    registered with a network slice, the current number of PDU Sessions established on a
    network slice or both.
  type: object
  properties:
    reachedNumUes:
      $ref: '#/components/schemas/SACInfo'
    reachedNumPduSess:
      $ref: '#/components/schemas/SACInfo'

SpatialValidityCond:
  description: Contains the Spatial Validity Condition.
  type: object
  properties:
    trackingAreaList:
      type: array
      items:
        $ref: '#/components/schemas/Tai'
      minItems: 1
    countries:
      type: array
      items:
        $ref: '#/components/schemas/Mcc'
      minItems: 1
    geographicalServiceArea:
      $ref: '#/components/schemas/GeoServiceArea'

SpatialValidityCondRm:
  description: Contains the Spatial Validity Condition or the null value.
  anyOf:
    - $ref: '#/components/schemas/SpatialValidityCond'
    - $ref: '#/components/schemas/NullValue'

ServerAddressingInfo:
  description: Contains addressing information (IP addresses and/or FQDNs) of a server.
  type: object

```

```

anyOf:
  - required:
    - ipv4Addresses
  - required:
    - ipv6Addresses
  - required:
    - fqdnList
properties:
  ipv4Addresses:
    type: array
    items:
      $ref: '#/components/schemas/Ipv4Addr'
    minItems: 1
  ipv6Addresses:
    type: array
    items:
      $ref: '#/components/schemas/Ipv6Addr'
    minItems: 1
  fqdnList:
    type: array
    items:
      $ref: '#/components/schemas/Fqdn'
    minItems: 1

PcfUeCallbackInfo:
  description: >
    Contains the PCF for the UE information necessary for the PCF for the PDU session to send
    SM Policy Association Establishment and Termination events.
  type: object
  properties:
    callbackUri:
      $ref: '#/components/schemas/Uri'
    bindingInfo:
      type: string
  nullable: true
  required:
    - callbackUri

PduSessionInfo:
  description: indicates the DNN and S-NSSAI combination of a PDU session.
  type: object
  properties:
    snssai:
      $ref: '#/components/schemas/Snssai'
    dnn:
      $ref: '#/components/schemas/Dnn'
  required:
    - dnn
    - snssai

EasIpReplacementInfo:
  description: Contains EAS IP replacement information for a Source and a Target EAS.
  type: object
  properties:
    source:
      $ref: '#/components/schemas/EasServerAddress'
    target:
      $ref: '#/components/schemas/EasServerAddress'
  required:
    - source
    - target

EasServerAddress:
  description: Represents the IP address and port of an EAS server.
  type: object
  properties:
    ip:
      $ref: '#/components/schemas/IpAddr'
    port:
      $ref: '#/components/schemas/UInteger'
  required:
    - ip
    - port

RoamingRestrictions:
  description: >
    Indicates if access is allowed to a given serving network, e.g. a PLMN (MCC, MNC) or an
    SNPN (MCC, MNC, NID).

```

```
type: object
properties:
  accessAllowed:
    type: boolean

GeoServiceArea:
description: List of geographic area or list of civic address info
type: object
properties:
  geographicAreaList:
    type: array
    items:
      $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicArea'
    minItems: 1
  civicAddressList:
    type: array
    items:
      $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/CivicAddress'
    minItems: 1

MutingExceptionInstructions:
description: >
  Indicates to an Event producer NF instructions for the subscription and stored events when
  an exception (e.g. full buffer) occurs at the Event producer NF while the event is muted.
type: object
properties:
  bufferedNotifs:
    $ref: '#/components/schemas/BufferedNotificationsAction'
  subscription:
    $ref: '#/components/schemas/SubscriptionAction'

MutingNotificationsSettings:
description: >
  Indicates the Event producer NF settings to the Event consumer NF
type: object
properties:
  maxNoOfNotif:
    type: integer
  durationBufferedNotif:
    $ref: '#/components/schemas/DurationSec'

CombGciAndHfcNIds:
description: >
  Combined Global Cable Identifier and HFC Node Id
type: object
properties:
  globalCableId:
    $ref: '#/components/schemas/Gci'
  hfcNId:
    $ref: '#/components/schemas/HfcNId'

VplmnOffloadingInfo:
description: VPLMN Specific Offloading Information
type: object
nullable: true
properties:
  offloadIdentifier:
    $ref: '#/components/schemas/OffloadIdentifier'
  vplmnId:
    $ref: '#/components/schemas/PlmnId'
  allowedTraffic:
    type: boolean
    default: true
  ipv4AddressRanges:
    type: array
    items:
      $ref: '#/components/schemas/Ipv4AddressRange'
    minItems: 1
  ipv4AddrMasks:
    type: array
    items:
      $ref: '#/components/schemas/Ipv4AddrMask'
    minItems: 1
  ipv6AddressRanges:
    type: array
    items:
      $ref: '#/components/schemas/Ipv6AddressRange'
```

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    minItems: 1
  ipv6PrefixRanges:
    type: array
    items:
      $ref: '#/components/schemas/Ipv6PrefixRange'
  minItems: 1
  fqdnList:
    type: array
    items:
      $ref: '#/components/schemas/Fqdn'
  minItems: 1
  fqdnPatterns:
    type: array
    items:
      $ref: '#/components/schemas/FqdnPatternMatchingRule'
  minItems: 1

PartiallyAllowedSnssai:
  description: >
    Indicates a S-NSSAI that is partially allowed in the Registration Area.
  type: object
  properties:
    snssai:
      $ref: '#/components/schemas/Snssai'
    allowedTaiList:
      type: array
      items:
        $ref: '#/components/schemas/Tai'
      minItems: 1
  required:
    - snssai
    - allowedTaiList

VarRepPeriod:
  description: >
    Indicates the Variable reporting periodicity for event reporting
  type: object
  properties:
    repPeriod:
      $ref: '#/components/schemas/DurationSec'
    percValueNfLoad:
      allOf:
        - $ref: '#/components/schemas/UInteger'
      minimum: 0
      maximum: 100
  required:
    - repPeriod

RangingSlPosAuth:
  description: >
    Indicates whether the UE is authorized to use related services.
  type: object
  properties:
    rgSlPosPc5Auth:
      $ref: '#/components/schemas/UeAuth'
    rgSlPosLocAuth:
      $ref: '#/components/schemas/UeAuth'
    rgSlPosClientAuth:
      $ref: '#/components/schemas/UeAuth'
    rgSlPosServerAuth:
      $ref: '#/components/schemas/UeAuth'

NrA2xAuth:
  description: Contains NR A2X services authorized information.
  type: object
  properties:
    uavUeAuth:
      $ref: '#/components/schemas/UeAuth'

LteA2xAuth:
  description: Contains LTE A2X services authorized information.
  type: object
  properties:
    uavUeAuth:
      $ref: '#/components/schemas/UeAuth'

```

```

SliceUsageControlInfo:
  description: The network slice usage control related information
  type: object
  required:
    - sNssai
  properties:
    sNssai:
      $ref: '#/components/schemas/Snssai'
    deregInactTimer:
      $ref: '#/components/schemas/DurationSec'
    sessInactTimer:
      $ref: '#/components/schemas/DurationSec'
  anyOf:
    - required: [ deregInactTimer ]
    - required: [ sessInactTimer ]

SnssaiDnnItem:
  description: Combination of S-NSSAIs and DNNs
  type: object
  properties:
    snssaiList:
      type: array
      items:
        $ref: '#/components/schemas/ExtSnssai'
      minItems: 1
    dnnList:
      type: array
      items:
        $ref: '#/components/schemas/Dnn'
      minItems: 1
  anyOf:
    - required: [ snssaiList ]
    - required: [ dnnList ]

NtnTaiInfo:
  description: Contains NR NTN TAI Information.
  type: object
  required:
    - plmnId
    - tacList
  properties:
    plmnId:
      $ref: '#/components/schemas/PlmnIdNid'
    tacList:
      type: array
      items:
        $ref: '#/components/schemas/Tac'
      minItems: 1
    derivedTac:
      $ref: '#/components/schemas/Tac'

MitigationInfo:
  description: include the congestion mitigation information.
  type: object
  properties:
    percValueNumUes:
      type: integer
      minimum: 0
      maximum: 100
    newUesInd:
      type: boolean

VplmnDLAmbr:
  description: an Authorized DL Session AMBR for Offloading for the VPLMN
  type: object
  nullable: true
  properties:
    vplmnId:
      $ref: '#/components/schemas/PlmnId'
    sessionDLAmbr:
      $ref: '#/components/schemas/BitRate'
  required:
    - vplmnId
    - sessionDLAmbr

LocalOffloadingManagementInfo:
  description: Local Offloading Management Information

```

```

type: object
nullable: true
properties:
  offloadIdentifier:
    $ref: '#/components/schemas/OffloadIdentifier'
  allowedTraffic:
    type: boolean
    default: true
  ipv4AddressRanges:
    type: array
    items:
      $ref: '#/components/schemas/Ipv4AddressRange'
    minItems: 1
  ipv4AddrMasks:
    type: array
    items:
      $ref: '#/components/schemas/Ipv4AddrMask'
    minItems: 1
  ipv6AddressRanges:
    type: array
    items:
      $ref: '#/components/schemas/Ipv6AddressRange'
    minItems: 1
  ipv6PrefixRanges:
    type: array
    items:
      $ref: '#/components/schemas/Ipv6PrefixRange'
    minItems: 1
  fqdnList:
    type: array
    items:
      $ref: '#/components/schemas/Fqdn'
    minItems: 1
  fqdnPatterns:
    type: array
    items:
      $ref: '#/components/schemas/FqdnPatternMatchingRule'
    minItems: 1

```

```

CagProvisionInformation:
  description: CAG Provision Information
  type: object
  required:
    - cagInfo
  properties:
    cagInfo:
      type: array
      items:
        $ref: '#/components/schemas/CagId'
      minItems: 1
    commonValidTimePeriodList:
      type: array
      items:
        $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/ValidTimePeriod'
      minItems: 0
    additionalValidTimePeriodList:
      description: >
        A map (list of key-value pairs) where CAG ID converted to string serves the key;
        and the value is an array of time periods associated with the CAG ID.
      type: object
      additionalProperties:
        type: array
        items:
          $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/ValidTimePeriod'
          minItems: 1
      minProperties: 1
    provisionOperation:
      $ref: '#/components/schemas/CagProvisionOperation'

```

```

#
# Data types describing alternative data types or combinations of data types
#

```

```

ExtSnssai:
  allOf:
    - $ref: '#/components/schemas/Snssai'
    - $ref: '#/components/schemas/SnssaiExtension'
  description: >

```

The sdRanges and wildcardSd attributes shall be exclusive from each other. If one of these attributes is present, the sd attribute shall also be present and it shall contain one

Slice

Differentiator value within the range of SD (if the sdRanges attribute is present) or with any value (if the wildcardSd attribute is present).

SnssaiReplaceInfo:

description: Indicates the status of an S-NSSAI and an alternative S-NSSAI optionally.

type: object

properties:

snssai:

\$ref: '#/components/schemas/Snssai'

status:

\$ref: '#/components/schemas/SnssaiStatus'

altSnssai:

\$ref: '#/components/schemas/Snssai'

nsReplTerminInd:

\$ref: '#/components/schemas/TerminationIndication'

plmnId:

\$ref: '#/components/schemas/PlmnId'

mitigationInfo:

\$ref: '#/components/schemas/MitigationInfo'

required:

- snssai

#

# Data Types related to 5G QoS as defined in clause 5.5

#

#

# SIMPLE DATA TYPES

#

#

Qfi:

type: integer

minimum: 0

maximum: 63

description: Unsigned integer identifying a QoS flow, within the range 0 to 63.

QfiRm:

type: integer

minimum: 0

maximum: 63

nullable: true

description: >

This data type is defined in the same way as the 'Qfi' data type, but with the OpenAPI 'nullable: true' property.

5Qi:

type: integer

minimum: 0

maximum: 255

description: >

Unsigned integer representing a 5G QoS Identifier (see clause 5.7.2.1 of 3GPP TS 23.501, within the range 0 to 255.

5QiRm:

type: integer

minimum: 0

maximum: 255

nullable: true

description: >

This data type is defined in the same way as the '5QiPriorityLevel' data type, but with the OpenAPI 'nullable: true' property. "

BitRate:

type: string

pattern: '^d+(\.\d+)? (bps|Kbps|Mbps|Gbps|Tbps)\$'

description: >

String representing a bit rate; the prefixes follow the standard symbols from The

International

System of Units, and represent x1000 multipliers, with the exception that prefix "K" is used to represent the standard symbol "k".

BitRateRm:

type: string

pattern: '^d+(\.\d+)? (bps|Kbps|Mbps|Gbps|Tbps)\$'

nullable: true  
description: >  
This data type is defined in the same way as the 'BitRate' data type, but with the OpenAPI 'nullable: true' property.

PacketRate:  
type: string  
pattern: '^d+(\.\d+)? (pps|kpps|Mpps|Gpps|Tpps)\$'  
description: >  
String representing a packet rate, i.e., packet per second; the prefixes follow the symbols from The International System of Units, and represent x1000 multipliers.

PacketRateRm:  
type: string  
pattern: '^d+(\.\d+)? (pps|kpps|Mpps|Gpps|Tpps)\$'  
nullable: true  
description: >  
This data type is defined in the same way as the 'PacketRate' data type, but with the OpenAPI 'nullable: true' property.

TrafficVolume:  
type: string  
pattern: '^d+(\.\d+)? (B|kB|MB|GB|TB)\$'  
description: >  
String representing a Traffic Volume measured in bytes; the prefixes follow the symbols from The International System of Units, and represent x1000 multipliers.

TrafficVolumeRm:  
type: string  
pattern: '^d+(\.\d+)? (B|kB|MB|GB|TB)\$'  
nullable: true  
description: >  
This data type is defined in the same way as the 'TrafficVolume' data type, but with the OpenAPI 'nullable: true' property.

ArpPriorityLevelRm:  
type: integer  
minimum: 1  
maximum: 15  
nullable: true  
description: >  
This data type is defined in the same way as the 'ArpPriorityLevel' data type, but with the OpenAPI 'nullable: true' property.

ArpPriorityLevel:  
type: integer  
minimum: 1  
maximum: 15  
nullable: true  
description: >  
nullable true shall not be used for this attribute. Unsigned integer indicating the ARP Priority Level (see clause 5.7.2.2 of 3GPP TS 23.501, within the range 1 to 15. Values are ordered in decreasing order of priority, i.e. with 1 as the highest priority and 15 as the lowest priority.

5QiPriorityLevel:  
type: integer  
minimum: 1  
maximum: 127  
description: >  
Unsigned integer indicating the 5QI Priority Level (see clauses 5.7.3.3 and 5.7.4 of 3GPP TS 23.501, within the range 1 to 127. Values are ordered in decreasing order of priority, i.e. with 1 as the highest priority and 127 as the lowest priority.

5QiPriorityLevelRm:  
type: integer  
minimum: 1  
maximum: 127  
nullable: true  
description: >  
This data type is defined in the same way as the '5QiPriorityLevel' data type, but with the OpenAPI 'nullable: true' property.

PacketDelBudget:  
type: integer  
minimum: 1  
description: >  
Unsigned integer indicating Packet Delay Budget (see clauses 5.7.3.4 and 5.7.4 of 3GPP

TS 23.501), expressed in milliseconds.

PacketDelBudgetRm:

type: integer  
minimum: 1  
nullable: true  
description: >  
This data type is defined in the same way as the 'PacketDelBudget' data type, but with the OpenAPI 'nullable: true' property.

PacketErrRate:

type: string  
pattern: '^([0-9]E-[0-9])\$'  
description: >  
String representing Packet Error Rate (see clause 5.7.3.5 and 5.7.4 of 3GPP TS 23.501, expressed as a "scalar x 10-k" where the scalar and the exponent k are each encoded as one decimal digit.

PacketErrRateRm:

type: string  
pattern: '^([0-9]E-[0-9])\$'  
nullable: true  
description: >  
This data type is defined in the same way as the 'PacketErrRate' data type, but with the OpenAPI 'nullable: true' property.

PacketLossRate:

type: integer  
minimum: 0  
maximum: 1000  
description: >  
Unsigned integer indicating Packet Loss Rate (see clauses 5.7.2.8 and 5.7.4 of 3GPP TS 23.501), expressed in tenth of percent.

PacketLossRateRm:

type: integer  
minimum: 0  
maximum: 1000  
nullable: true  
description: >  
This data type is defined in the same way as the 'PacketLossRate' data type, but with the OpenAPI 'nullable: true' property.

AverWindow:

type: integer  
minimum: 1  
maximum: 4095  
default: 2000  
description: >  
Unsigned integer indicating Averaging Window (see clause 5.7.3.6 and 5.7.4 of 3GPP TS 23.501), expressed in milliseconds.

AverWindowRm:

type: integer  
maximum: 4095  
default: 2000  
minimum: 1  
nullable: true  
description: >  
This data type is defined in the same way as the 'AverWindow' data type, but with the OpenAPI 'nullable: true' property.

MaxDataBurstVol:

type: integer  
minimum: 1  
maximum: 4095  
description: >  
Unsigned integer indicating Maximum Data Burst Volume (see clauses 5.7.3.7 and 5.7.4 of 3GPP TS 23.501), expressed in Bytes.

MaxDataBurstVolRm:

type: integer  
minimum: 1  
maximum: 4095  
nullable: true  
description: >  
This data type is defined in the same way as the 'MaxDataBurstVol' data type, but with the OpenAPI 'nullable: true' property.

```
SamplingRatio:
  type: integer
  minimum: 1
  maximum: 100
  description: >
    Unsigned integer indicating Sampling Ratio (see clauses 4.15.1 of 3GPP TS 23.502),
    expressed in percent.

SamplingRatioRm:
  type: integer
  minimum: 1
  maximum: 100
  nullable: true
  description: >
    This data type is defined in the same way as the 'SamplingRatio' data type, but with the
    OpenAPI 'nullable: true' property.
#
RgWirelineCharacteristics:
  $ref: '#/components/schemas/Bytes'

RgWirelineCharacteristicsRm:
  anyOf:
    - $ref: '#/components/schemas/RgWirelineCharacteristics'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'RgWirelineCharacteristics' data type,
    but with the OpenAPI 'nullable: true' property.

ExtMaxDataBurstVol:
  type: integer
  minimum: 4096
  maximum: 2000000
  description: >
    Unsigned integer indicating Maximum Data Burst Volume (see clauses 5.7.3.7 and 5.7.4 of
    3GPP TS 23.501), expressed in Bytes.

ExtMaxDataBurstVolRm:
  type: integer
  minimum: 4096
  maximum: 2000000
  nullable: true
  description: >
    This data type is defined in the same way as the 'ExtMaxDataBurstVol' data type, but
    with the OpenAPI 'nullable: true' property.

ExtPacketDelBudget:
  type: integer
  minimum: 1
  description: >
    Unsigned integer indicating Packet Delay Budget (see clauses 5.7.3.4 and 5.7.4 of 3GPP
    TS 23.501 [8]), expressed in 0.01 milliseconds.

ExtPacketDelBudgetRm:
  type: integer
  minimum: 1
  nullable: true
  description: >
    This data type is defined in the same way as the 'ExtPacketDelBudget' data type, but
    with the OpenAPI 'nullable: true' property. "

Metadata:
  format: byte
  type: string
  nullable: true
  description: >
    A String which is transparently passed to the UPF to be applied for traffic to SFC.

#
# ENUMERATED DATA TYPES
#
PreemptionCapability:
  anyOf:
    - type: string
      enum:
        - NOT_PREEMPT
```

```
- MAY_PREEMPT
- type: string
description: >
  The enumeration PreemptionCapability indicates the pre-emption capability of a request on
  other QoS flows. See clause 5.7.2.2 of 3GPP TS 23.501. It shall comply with the provisions
  defined in table 5.5.3.1-1.
PreemptionCapabilityRm:
  anyOf:
    - $ref: '#/components/schemas/PreemptionCapability'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This enumeration is defined in the same way as the 'PreemptionCapability' enumeration,
    but with the OpenAPI 'nullable: true' property.

PreemptionVulnerability:
  anyOf:
    - type: string
      enum:
        - NOT_PREEMPTABLE
        - PREEMPTABLE
    - type: string
  description: >
    The enumeration PreemptionVulnerability indicates the pre-emption vulnerability of the QoS
    flow to pre-emption from other QoS flows. See clause 5.7.2.2 of 3GPP TS 23.501. It shall
    comply with the provisions defined in table 5.5.3.2-1

PreemptionVulnerabilityRm:
  anyOf:
    - $ref: '#/components/schemas/PreemptionVulnerability'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This enumeration is defined in the same way as the 'PreemptionVulnerability' enumeration,
    but with the OpenAPI 'nullable: true' property."

ReflectiveQoSAttribute:
  anyOf:
    - type: string
      enum:
        - RQOS
        - NO_RQOS
    - type: string
  description: >
    The enumeration ReflectiveQoSAttribute indicates whether certain traffic of the QoS flow may
    be subject to Reflective QoS (see clause 5.7.2.3 of 3GPP TS 23.501). It shall comply with
    the provisions defined in table 5.5.3.3-1.

ReflectiveQoSAttributeRm:
  anyOf:
    - $ref: '#/components/schemas/ReflectiveQoSAttribute'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This enumeration is defined in the same way as the 'ReflectiveQoSAttribute' enumeration,
    but with the OpenAPI 'nullable: true' property. "

NotificationControl:
  anyOf:
    - type: string
      enum:
        - REQUESTED
        - NOT_REQUESTED
    - type: string
  description: >
    The enumeration NotificationControl indicates whether notifications are requested from the
    RAN when the GFBR can no longer (or again) be fulfilled for a QoS Flow during the lifetime
    of the QoS Flow (see clause 5.7.2.4 of 3GPP TS 23.501).
    It shall comply with the provisions defined in table 5.5.3.5-1.

NotificationControlRm:
  anyOf:
    - $ref: '#/components/schemas/NotificationControl'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This enumeration is defined in the same way as the 'NotificationControl' enumeration, but
    with the OpenAPI 'nullable: true' property.

QoSResourceType:
  anyOf:
    - type: string
```

```

    enum:
      - NON_GBR
      - NON_CRITICAL_GBR
      - CRITICAL_GBR
    - type: string
  description: >
    The enumeration QoSResourceType indicates whether a QoS Flow is non-GBR, delay critical GBR,
    or non-delay critical GBR (see clauses 5.7.3.4 and 5.7.3.5 of 3GPP TS 23.501). It shall
    comply with the provisions defined in table 5.5.3.6-1.

QoSResourceTypeRm:
  anyOf:
    - $ref: '#/components/schemas/QoSResourceType'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This enumeration is defined in the same way as the 'QoSResourceType' enumeration, but
    with the OpenAPI 'nullable: true' property.

AdditionalQoSFlowInfo:
  anyOf:
    - anyOf:
      - type: string
      enum:
        - MORE_LIKELY
      - type: string
    - $ref: '#/components/schemas/NullValue'
  description: >
    The enumeration AdditionalQoSFlowInfo provides additional QoS flow information (see clause
    9.3.1.12 3GPP TS 38.413 [11]). It shall comply with the provisions defined in table
    5.5.3.12-1.

PartitioningCriteria:
  anyOf:
    - type: string
      enum:
        - TAC
        - SUBPLMN
        - GEOAREA
        - SNSSAI
        - DNN
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.
  description: |
    Possible values are:
    - "TAC": Type Allocation Code
    - "SUBPLMN": Subscriber PLMN ID
    - "GEOAREA": Geographical area, i.e. list(s) of TAI(s)
    - "SNSSAI": S-NSSAI
    - "DNN": DNN

PartitioningCriteriaRm:
  anyOf:
    - $ref: '#/components/schemas/PartitioningCriteria'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the ' PartitioningCriteria ' data type, but
    with the OpenAPI 'nullable: true' property.

PduSetHandlingInfo:
  anyOf:
    - type: string
      enum:
        - ALL_PDUS_NEEDED
        - ALL_PDUS_NOT_NEEDED
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.
  description: |
    Possible values are:
    - "ALL_PDUS_NEEDED": All PDUs of the PDU Set are needed
    - "ALL_PDUS_NOT_NEEDED": All PDUs of the PDU Set are not needed

MediaTransportProto:

```

```
anyOf:
  - type: string
    enum:
      - RTP
      - SRTP
      - MOQT
  - type: string
description: >
  The enumeration MediaTransportProto indicates the transport protocol used for a media flow.
```

```
MediaTransportProtoRm:
  anyOf:
    - $ref: '#/components/schemas/MediaTransportProto'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'MediaTransportProto' data type,
    but with the OpenAPI 'nullable: true' property.
```

```
RtpHeaderExtType:
  anyOf:
    - type: string
      enum:
        - PDU_SET_MARKING
        - DYN_CHANGING_TRAFFIC_CHAR
        - EXPEDITED_TRANSFER_IND
    - type: string
  description: >
    The enumeration indicates the type of Rtp Header Extension type
```

```
RtpHeaderExtTypeRm:
  anyOf:
    - $ref: '#/components/schemas/RtpHeaderExtType'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'RtpHeaderExtType' data type,
    but with the OpenAPI 'nullable: true' property.
```

```
RtpPayloadFormat:
  anyOf:
    - type: string
      enum:
        - H264
        - H265
    - type: string
  description: >
    The enumeration RtpPayloadFormat indicates the RTP Payload format
```

```
RtpPayloadFormatRm:
  anyOf:
    - $ref: '#/components/schemas/RtpPayloadFormat'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'RtpPayloadFormat' data type, but with the
    OpenAPI 'nullable: true' property.
```

```
MriTransferMethod:
  anyOf:
    - type: string
      enum:
        - UDP_OPTION
    - type: string
  description: >
    This data type indicates the method used for transferring Media Related Information.
```

```
MriTransferMethodRm:
  anyOf:
    - $ref: '#/components/schemas/MriTransferMethod'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This data type is defined in the same way as the 'MriTransferMethod' data type,
    but with the OpenAPI 'nullable: true' property.
```

```
#
#
# STRUCTURED DATA TYPES
```

#

```

Arp:
  description: Contains Allocation and Retention Priority information.
  type: object
  properties:
    priorityLevel:
      $ref: '#/components/schemas/ArpPriorityLevel'
    preemptCap:
      $ref: '#/components/schemas/PreemptionCapability'
    preemptVuln:
      $ref: '#/components/schemas/PreemptionVulnerability'
  required:
    - priorityLevel
    - preemptCap
    - preemptVuln

Ambr:
  description: Contains the maximum aggregated uplink and downlink bit rates.
  type: object
  properties:
    uplink:
      $ref: '#/components/schemas/BitRate'
    downlink:
      $ref: '#/components/schemas/BitRate'
  required:
    - uplink
    - downlink

Dynamic5Qi:
  description: >
    It indicates the QoS Characteristics for a Non-standardised or not pre-configured 5QI
    for downlink and uplink.
  type: object
  properties:
    resourceType:
      $ref: '#/components/schemas/QosResourceType'
    priorityLevel:
      $ref: '#/components/schemas/5QiPriorityLevel'
    packetDelayBudget:
      $ref: '#/components/schemas/PacketDelBudget'
    packetErrRate:
      $ref: '#/components/schemas/PacketErrRate'
    averWindow:
      $ref: '#/components/schemas/AverWindow'
    maxDataBurstVol:
      $ref: '#/components/schemas/MaxDataBurstVol'
    extMaxDataBurstVol:
      $ref: '#/components/schemas/ExtMaxDataBurstVol'
    extPacketDelBudget:
      $ref: '#/components/schemas/ExtPacketDelBudget'
    cnPacketDelayBudgetDl:
      $ref: '#/components/schemas/ExtPacketDelBudget'
    cnPacketDelayBudgetUl:
      $ref: '#/components/schemas/ExtPacketDelBudget'
  required:
    - resourceType
    - priorityLevel
    - packetDelayBudget
    - packetErrRate

NonDynamic5Qi:
  description: >
    It indicates the QoS Characteristics for a standardized or pre-configured 5QI for downlink
    and uplink.
  type: object
  properties:
    priorityLevel:
      $ref: '#/components/schemas/5QiPriorityLevel'
    averWindow:
      $ref: '#/components/schemas/AverWindow'
    maxDataBurstVol:
      $ref: '#/components/schemas/MaxDataBurstVol'
    extMaxDataBurstVol:
      $ref: '#/components/schemas/ExtMaxDataBurstVol'
    cnPacketDelayBudgetDl:
      $ref: '#/components/schemas/ExtPacketDelBudget'
    cnPacketDelayBudgetUl:

```

```

    $ref: '#/components/schemas/ExtPacketDelBudget'
    minProperties: 0

```

## ArpRm:

```

    anyOf:
      - $ref: '#/components/schemas/Arp'
      - $ref: '#/components/schemas/NullValue'
    description: >
      This data type is defined in the same way as the 'Arp' data type, but with the
      OpenAPI 'nullable: true' property.

```

## AmbrRm:

```

    anyOf:
      - $ref: '#/components/schemas/Ambr'
      - $ref: '#/components/schemas/NullValue'
    description: >
      This data type is defined in the same way as the 'Ambr' data type, but with the
      OpenAPI 'nullable: true' property."

```

## SliceMbr:

```

    description: MBR related to slice
    type: object
    properties:
      uplink:
        $ref: '#/components/schemas/BitRate'
      downlink:
        $ref: '#/components/schemas/BitRate'
    required:
      - uplink
      - downlink

```

## SliceMbrRm:

```

    description: "SliceMbr with nullable: true"

    anyOf:
      - $ref: '#/components/schemas/SliceMbr'
      - $ref: '#/components/schemas/NullValue'

```

## PduSetQosPara:

```

    description: Represents the PDU Set level QoS parameters.
    type: object
    properties:
      pduSetDelayBudget:
        $ref: '#/components/schemas/ExtPacketDelBudget'
      pduSetErrRate:
        $ref: '#/components/schemas/PacketErrRate'
      pduSetHandlingInfo:
        $ref: '#/components/schemas/PduSetHandlingInfo'
    anyOf:
      - required: [ pduSetDelayBudget, pduSetErrRate ]
      - required: [ pduSetHandlingInfo ]

```

#

## PduSetQosParaRm:

```

    description: "PduSetQosPara contains removable attributes"
    type: object
    nullable: true
    properties:
      pduSetDelayBudget:
        $ref: '#/components/schemas/ExtPacketDelBudgetRm'
      pduSetErrRate:
        $ref: '#/components/schemas/PacketErrRateRm'
      pduSetHandlingInfo:
        $ref: '#/components/schemas/PduSetHandlingInfoRm'

```

## ProtocolDescription:

```

    description: ProtocolDescription contains information to derive PDU set information.
    type: object
    properties:
      transportProto:
        $ref: '#/components/schemas/MediaTransportProto'
      rtpHeaderExtInfo:
        $ref: '#/components/schemas/RtpHeaderExtInfo'
      addRtpHeaderExtInfo:
        type: array
        items:
          $ref: '#/components/schemas/RtpHeaderExtInfo'

```

```

    minItems: 1
  rtpPayloadInfoList:
    type: array
    items:
      $ref: '#/components/schemas/RtpPayloadInfo'
    minItems: 1
  mriTransferInfo:
    $ref: '#/components/schemas/MriTransferMethod'

```

```

ProtocolDescriptionRm:
  description: Describes the modifications to the ProtocolDescription data type.
  type: object
  nullable: true
  properties:
    transportProto:
      $ref: '#/components/schemas/MediaTransportProtoRm'
    rtpHeaderExtInfo:
      $ref: '#/components/schemas/RtpHeaderExtInfoRm'
    addRtpHeaderExtInfo:
      type: array
      nullable: true
      items:
        $ref: '#/components/schemas/RtpHeaderExtInfo'
      minItems: 1
    rtpPayloadInfoList:
      type: array
      nullable: true
      items:
        $ref: '#/components/schemas/RtpPayloadInfo'
      minItems: 1
    mriTransferInfo:
      $ref: '#/components/schemas/MriTransferMethodRm'

```

```

RtpHeaderExtInfo:
  description: RTP Header Extension information
  type: object
  properties:
    rtpHeaderExtType:
      $ref: '#/components/schemas/RtpHeaderExtType'
    rtpHeaderExtId:
      type: integer
      minimum: 1
      maximum: 255
    longFormat:
      type: boolean
    pduSetSizeActive:
      type: boolean
    pduSetPduCountActive:
      type: boolean

```

```

RtpHeaderExtInfoRm:
  description: Describes the modifications to RtpHeaderExtInfo data type
  type: object
  nullable: true
  properties:
    rtpHeaderExtType:
      $ref: '#/components/schemas/RtpHeaderExtTypeRm'
    rtpHeaderExtId:
      type: integer
      nullable: true
      minimum: 1
      maximum: 255
    longFormat:
      type: boolean
      nullable: true
    pduSetSizeActive:
      type: boolean
      nullable: true
    pduSetPduCountActive:
      type: boolean
      nullable: true

```

```

RtpPayloadInfo:
  description: RtpPayloadInfo contains Rtp payload type and format.
  type: object
  properties:
    rtpPayloadTypeList:

```

```
    type: array
    items:
      type: integer
      minimum: 0
      maximum: 127
    minItems: 1
  rtpPayloadFormat:
    $ref: '#/components/schemas/RtpPayloadFormat'

RtpPayloadInfoRm:
  nullable: true
  description: Describes the modifications to the RtpPayloadInfo data type.
  type: object
  properties:
    rtpPayloadTypeList:
      type: array
      nullable: true
      items:
        type: integer
        minimum: 0
        maximum: 127
      minItems: 1
    rtpPayloadFormat:
      $ref: '#/components/schemas/RtpPayloadFormatRm'

PduSetHandlingInfoRm:
  anyOf:
    - $ref: '#/components/schemas/PduSetHandlingInfo'
    - $ref: '#/components/schemas/NullValue'
  description: >
    This enumeration is defined in the same way as the 'PduSetHandlingInfo' enumeration,
    but with the OpenAPI 'nullable: true' property.

MriTransferInfo:
  description: Describes how media related information is transferred
  type: object
  properties:
    transferMethod:
      $ref: '#/components/schemas/MriTransferMethod'

MriTransferInfoRm:
  description: Describes how media related information is transferred
  type: object
  nullable: true
  properties:
    transferMethod:
      $ref: '#/components/schemas/MriTransferMethodRm'

#
# Data Types related to 5G Trace as defined in clause 5.6
#
#
# SIMPLE DATA TYPES
#

PhysCellId:
  type: integer
  minimum: 0
  maximum: 1007
  description: >
    Integer value identifying the physical cell identity (PCI), as definition of "PhysCellId" IE
    in clause 6.3.2 of 3GPP TS 38.331.

ArfcnValueNR:
  type: integer
  minimum: 0
  maximum: 3279165
  description: >
    Integer value indicating the ARFCN applicable for a downlink, uplink or bi-directional (TDD)
    NR global frequency raster,
    as definition of "ARFCN-ValueNR" IE in clause 6.3.2 of 3GPP TS 38.331.

QoeReference:
  description: >
    String containing MCC (3 digits), MNC (2 or 3 digits)
    and QMC ID (3 octets, encoded as 6 hexadecimal digits).
```

```

type: string
pattern: '^[0-9]{3}-[0-9]{2,3}-[A-Fa-f0-9]{6}$'

```

#### MdtAlignmentInfo:

```

description: |
  String containing:
  - Trace Reference: MCC (3 digits), MNC (2 or 3 digits),
    Trace ID (3 octets, encoded as 6 hexadecimal digits)
  - Trace Recording Session Reference (2 octets, encoded as 4 hexadecimal digits)
format: string
pattern: '^[0-9]{3}-[0-9]{2,3}-[A-Fa-f0-9]{6}-[A-Fa-f0-9]{4}$'

```

```

#
#
# Enumerations
#

```

#### TraceDepth:

```

anyOf:
  - type: string
    enum:
      - MINIMUM
      - MEDIUM
      - MAXIMUM
      - MINIMUM_WO_VENDOR_EXTENSION
      - MEDIUM_WO_VENDOR_EXTENSION
      - MAXIMUM_WO_VENDOR_EXTENSION
  - type: string
description: >
  The enumeration TraceDepth defines how detailed information should be recorded
  in the trace. See 3GPP TS 32.422 for further description of the values.
  It shall comply with the provisions defined in table 5.6.3.1-1

```

#### TraceDepthRm:

```

anyOf:
  - $ref: '#/components/schemas/TraceDepth'
  - $ref: '#/components/schemas/NullValue'
description: >
  This enumeration is defined in the same way as the 'TraceDepth' enumeration, but with
  the OpenAPI 'nullable: true' property.

```

#### JobType:

```

anyOf:
  - type: string
    enum:
      - IMMEDIATE_MDT_ONLY
      - LOGGED_MDT_ONLY
      - TRACE_ONLY
      - IMMEDIATE_MDT_AND_TRACE
      - LOGGED_MBSFN_MDT
      - 5GC_UE_LEVEL_MEASUREMENTS_ONLY
      - TRACE_AND_5GC_UE_LEVEL_MEASUREMENTS_ONLY
      - IMMEDIATE_MDT_AND_5GC_UE_LEVEL_MEASUREMENTS
      - TRACE_IMMEDIATE_MDT_AND_5GC_UE_LEVEL_MEASUREMENTS
  - type: string
description: >
  The enumeration JobType defines Job Type in the trace. See 3GPP TS 32.422 for further
  description of the values. It shall comply with the provisions defined in table 5.6.3.3-1.

```

#### ReportTypeMdt:

```

anyOf:
  - type: string
    enum:
      - PERIODICAL
      - EVENT_TRIGGERED
  - type: string
description: >
  The enumeration ReportTypeMdt defines Report Type for logged MDT in the trace. See 3GPP TS
  32.422 for further description of the values. It shall comply with the provisions defined
  in table 5.6.3.4-1.

```

#### MeasurementLteForMdt:

```

anyOf:
  - type: string
    enum:
      - M1
      - M2
      - M3

```

- M4\_DL
- M4\_UL
- M5\_DL
- M5\_UL
- M6\_DL
- M6\_UL
- M7\_DL
- M7\_UL
- M8
- M9

- type: string

description: >  
 The enumeration MeasurementLteForMdt defines Measurements used for MDT in LTE in the trace. See 3GPP TS 32.422 for further description of the values. It shall comply with the provisions defined in table 5.6.3.5-1.

## MeasurementNrForMdt:

anyOf:

- type: string
- enum:
  - M1
  - M2
  - M3
  - M4\_DL
  - M4\_UL
  - M5\_DL
  - M5\_UL
  - M6\_DL
  - M6\_UL
  - M7\_DL
  - M7\_UL
  - M8
  - M9
- type: string

description: >  
 The enumeration MeasurementNrForMdt defines Measurements used for MDT in NR in the trace. See 3GPP TS 32.422 for further description of the values. It shall comply with the provisions defined in table 5.6.3.6-1.

## SensorMeasurement:

anyOf:

- type: string
- enum:
  - BAROMETRIC\_PRESSURE
  - UE\_SPEED
  - UE\_ORIENTATION
- type: string

description: >  
 The enumeration SensorMeasurement defines sensor measurement type for MDT in the trace. See 3GPP TS 32.422 for further description of the values. It shall comply with the provisions defined in table 5.6.3.7-1.

## ReportingTrigger:

anyOf:

- type: string
- enum:
  - PERIODICAL
  - EVENT\_A2
  - EVENT\_A2\_PERIODIC
  - ALL\_RRM\_EVENT\_TRIGGERS
- type: string

description: >  
 The enumeration ReportingTrigger defines Reporting Triggers for MDT in the trace. See 3GPP TS 32.422 for further description of the values. It shall comply with the provisions defined in table 5.6.3.8-1.

## ReportIntervalMdt:

anyOf:

- type: string
- enum:
  - 120
  - 240
  - 480
  - 640
  - 1024
  - 2048
  - 5120
  - 10240

- 60000
- 360000
- 720000
- 1800000
- 3600000

- type: string

description: >

The enumeration ReportIntervalMdt defines Report Interval for MDT in the trace. See 3GPP TS 32.422 for further description of the values. It shall comply with the provisions defined in table 5.6.3.9-1.

ReportAmountMdt:

anyOf:

- type: string
- enum:
  - 1
  - 2
  - 4
  - 8
  - 16
  - 32
  - 64
  - infinity
- type: string

description: >

The enumeration ReportAmountMdt defines Report Amount for MDT in the trace. See 3GPP TS 32.422 for further description of the values. It shall comply with the provisions defined in table 5.6.3.10-1.

EventForMdt:

anyOf:

- type: string
- enum:
  - OUT\_OF\_COVERAG
  - A2\_EVENT
- type: string

description: >

The enumeration EventForMdt defines events triggered measurement for logged MDT in the trace. See 3GPP TS 32.422 for further description of the values. It shall comply with the provisions defined in table 5.6.3.11-1

LoggingIntervalMdt:

anyOf:

- type: string
- enum:
  - 128
  - 256
  - 512
  - 1024
  - 2048
  - 3072
  - 4096
  - 6144
- type: string

description: >

The enumeration LoggingIntervalMdt defines Logging Interval for MDT in the trace. See 3GPP TS 32.422 for further description of the values. It shall comply with the provisions defined in table 5.6.3.12-1.

LoggingDurationMdt:

anyOf:

- type: string
- enum:
  - 600
  - 1200
  - 2400
  - 3600
  - 5400
  - 7200
- type: string

description: >

The enumeration LoggingIntervalMdt defines Logging Interval for MDT in the trace. See 3GPP TS 32.422 for further description of the values. It shall comply with the provisions defined in table 5.6.3.12-1.

PositioningMethodMdt:

anyOf:

- type: string

```
enum:
  - GNSS
  - E_CELL_ID
- type: string
description: >
The enumeration LoggingDurationMdt defines Logging Duration for MDT in the trace. See 3GPP
TS 32.422 for further description of the values. It shall comply with the provisions
defined in table 5.6.3.13-1.

CollectionPeriodRmmLteMdt:
anyOf:
  - type: string
  enum:
    - 1024
    - 1280
    - 2048
    - 2560
    - 5120
    - 10240
    - 60000
  - type: string
description: >
The enumeration CollectionPeriodRmmLteMdt defines Collection period for RRM measurements
LTE for MDT in the trace. See 3GPP TS 32.422 for further description of the values.
It shall comply with the provisions defined in table 5.6.3.15-1.

MeasurementPeriodLteMdt:
anyOf:
  - type: string
  enum:
    - 1024
    - 1280
    - 2048
    - 2560
    - 5120
    - 10240
    - 60000
  - type: string
description: >
The enumeration MeasurementPeriodLteMdt defines Measurement period LTE for MDT in the
trace. See 3GPP TS 32.422 for further description of the values. It shall comply
with the provisions defined in table 5.6.3.16-1.

ReportIntervalNrMdt:
anyOf:
  - type: string
  enum:
    - 120
    - 240
    - 480
    - 640
    - 1024
    - 2048
    - 5120
    - 10240
    - 20480
    - 40960
    - 60000
    - 360000
    - 720000
    - 1800000
    - 3600000
  - type: string
description: >
The enumeration ReportIntervalNrMdt defines Report Interval in NR for MDT in the trace. See
3GPP TS 32.422 for further description of the values. It shall comply with the provisions
defined in table 5.6.3.17-1.

LoggingIntervalNrMdt:
anyOf:
  - type: string
  enum:
    - 128
    - 256
    - 512
    - 1024
    - 2048
    - 3072
```

- 4096
- 6144
- 320
- 640
- infinity
- type: string

description: >  
The enumeration LoggingIntervalNrMdt defines Logging Interval in NR for MDT in the trace. See 3GPP TS 32.422 for further description of the values. It shall comply with the provisions defined in table 5.6.3.18-1.

CollectionPeriodRmmNrMdt:

anyOf:

- type: string
- enum:
  - 1024
  - 2048
  - 5120
  - 10240
  - 60000
- type: string

description: >  
The enumeration CollectionPeriodRmmNrMdt defines Collection period for RRM measurements NR for MDT in the trace. See 3GPP TS 32.422 for further description of the values. It shall comply with the provisions defined in table 5.6.3.19-1

LoggingDurationNrMdt:

anyOf:

- type: string
- enum:
  - 600
  - 1200
  - 2400
  - 3600
  - 5400
  - 7200
- type: string

description: >  
The enumeration LoggingDurationMdt defines Logging Duration in NR for MDT in the trace. See 3GPP TS 32.422 for further description of the values. It shall comply with the provisions defined in table 5.6.3.20-1.

QoeServiceType:

description: >  
The enumeration QoeServiceType indicates the kind of service that shall be recorded for QMC. It shall comply with the provisions defined in TS 29.571, table 5.6.3.21-1.

anyOf:

- type: string
- enum:
  - DASH
  - MTSI
  - VR
- type: string

description: >  
This string provides forward-compatibility with future extensions to the enumeration but is not used to encode content defined in the present version of this API.

AvailableRanVisibleQoeMetric:

description: >  
The enumeration AvailableRanVisibleQoeMetric indicates different available RAN-visible QoE metrics to the gNB. It shall comply with the provisions defined in TS 29.571, table 5.6.3.22-1.

anyOf:

- type: string
- enum:
  - APPLICATION\_LAYER\_BUFFER\_LEVEL\_LIST
  - PLAYOUT\_DELAY\_FOR\_MEDIA\_STARTUP
- type: string

description: >  
This string provides forward-compatibility with future extensions to the enumeration but is not used to encode content defined in the present version of this API.

MeasurementType:

anyOf:

- type: string
- enum:
  - GTP\_DELAYDLPSAUPFUEMEAN\_SNSSAI\_QFI
  - GTP\_DELAYULPSAUPFUEMEANEXCD1\_SNSSAI\_QFI

```

- GTP_DELAYDLPSAUPFUEMEANINCD1_SNSSAI_QFI
- GTP_DELAYULPSAUPFNNGRANMEAN_SNSSAI_QFI
- GTP_DELAYDLPSAUPFNNGRANMEAN_SNSSAI_QFI
- GTP_RTDELAYPSAUPFNNGRANMEAN
- GTP_RTDELAYPSAUPFNNGRANMEAN_SNSSAI
- GTP_RTDELAYPSAUPFNNGRANMEAN_QFI
- GTP_RTDELAYPSAUPFNNGRANMEAN_SNSSAI_QFI
- type: string
description: >
  The enumeration MeasurementType defines Measurement Type in the
  5GC UE level measurements trace.

```

```

BluetoothRssi:
  anyOf:
    - type: string
      enum:
        - TRUE
    - type: string
  description: >
    The enumeration BluetoothRssi defines RSSI measurement by UE for Bluetooth.

```

```

WlanRssi:
  anyOf:
    - type: string
      enum:
        - TRUE
    - type: string
  description: >
    The enumeration WlanRssi defines RSSI measurement by UE for WLAN.

```

```

WlanRtt:
  anyOf:
    - type: string
      enum:
        - TRUE
    - type: string
  description: >
    The enumeration WlanRtt defines RTT measurement by UE for WLAN.

```

```

#
# STRUCTURED DATA TYPES
#

```

```

TraceData:
  description: contains Trace control and configuration parameters.
  type: object
  nullable: true
  properties:
    traceRef:
      type: string
      pattern: '^[0-9]{3}[0-9]{2,3}-[A-Fa-f0-9]{6}$'
      description: >
        Trace Reference (see 3GPP TS 32.422). It shall be encoded as the concatenation
        of MCC, MNC and Trace ID as follows: <MCC><MNC>-<Trace ID>
        The Trace ID shall be encoded as a 3 octet string in hexadecimal
        representation. Each character in the Trace ID string shall
        take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits.
        The most significant character representing the 4 most significant bits of the
        Trace ID shall appear first in the string, and the character representing the
        4 least significant bit of the Trace ID shall appear last in the string.

    traceDepth:
      $ref: '#/components/schemas/TraceDepth'

    neTypeList:
      type: string
      pattern: '^[A-Fa-f0-9]+$'
      description: >
        List of NE Types (see 3GPP TS 32.422). It shall be encoded as an octet string
        in hexadecimal representation. Each character in the string shall take a value
        of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits.
        The most significant character representing the 4 most significant bits shall
        appear first in the string, and the character representing the 4 least
        significant bit shall appear last in the string. Octets shall be coded
        according to 3GPP TS 32.422.

    eventList:
      type: string
      pattern: '^[A-Fa-f0-9]+$'

```

```

description: >
  Triggering events (see 3GPP TS 32.422). It shall be encoded as an octet string in
  hexadecimal representation. Each character in the string shall take a value of "0"
  to "9", "a" to "f" or "A" to "F" and shall represent 4 bits.
  The most significant character representing the 4 most significant bits shall
  appear first in the string, and the character representing the 4 least
  significant bit shall appear last in the string. Octets shall be coded
  according to 3GPP TS 32.422.
collectionEntityIpv4Addr:
  $ref: '#/components/schemas/Ipv4Addr'
collectionEntityIpv6Addr:
  $ref: '#/components/schemas/Ipv6Addr'
traceReportingConsumerUri:
  $ref: '#/components/schemas/Uri'
interfaceList:
  type: string
  pattern: '^[A-Fa-f0-9]+$'
  description: >
    List of Interfaces (see 3GPP TS 32.422). It shall be encoded as an octet string in
    hexadecimal representation.
    Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F"
    and shall represent 4 bits. The most significant character representing the 4 most
    significant bits shall appear first in the string, and the character representing the
    4 least significant bit shall appear last in the string. Octets shall be coded
    according to 3GPP TS 32.422. If this attribute is not present, all the interfaces
    applicable to the list of NE types indicated in the neTypeList attribute should
    be traced.
jobType:
  $ref: '#/components/schemas/JobType'
required:
  - traceRef
  - traceDepth
  - neTypeList
  - eventList

MdtConfiguration:
description: contains contain MDT configuration data.
type: object
required:
  - jobType
properties:
  jobType:
    $ref: '#/components/schemas/JobType'
  reportType:
    $ref: '#/components/schemas/ReportTypeMdt'
  areaScope:
    $ref: '#/components/schemas/AreaScope'
  measurementLteList:
    type: array
    items:
      $ref: '#/components/schemas/MeasurementLteForMdt'
  measurementNrList:
    type: array
    items:
      $ref: '#/components/schemas/MeasurementNrForMdt'
    minItems: 1
  sensorMeasurementList:
    type: array
    items:
      $ref: '#/components/schemas/SensorMeasurement'
    minItems: 1
  sensorMeasurementLteList:
    type: array
    items:
      $ref: '#/components/schemas/SensorMeasurement'
    minItems: 1
  reportingTriggerList:
    type: array
    items:
      $ref: '#/components/schemas/ReportingTrigger'
    minItems: 1
  reportInterval:
    $ref: '#/components/schemas/ReportIntervalMdt'
  reportIntervalNr:
    $ref: '#/components/schemas/ReportIntervalNrMdt'
  reportAmount:
    $ref: '#/components/schemas/ReportAmountMdt'
  reportAmountPerMeasurementLte:

```

```

type: object
additionalProperties:
  $ref: '#/components/schemas/ReportAmountMdt'
minProperties: 1
description: >
  A map (list of key-value pairs) where MeasurementLteForMdt serves as key;
reportAmountPerMeasurementNr:
type: object
additionalProperties:
  $ref: '#/components/schemas/ReportAmountMdt'
minProperties: 1
description: >
  A map (list of key-value pairs) where MeasurementNrForMdt serves as key;
eventThresholdRsrp:
type: integer
minimum: 0
maximum: 97
description: >
  This IE shall be present if the report trigger parameter is configured for A2 event reporting or A2 event triggered periodic reporting and the job type parameter is configured for Immediate MDT or combined Immediate MDT and Trace in LTE. When present, this IE shall indicate the Event Threshold for RSRP, and the value shall be between 0-97.
mnOnlyInd:
type: boolean
default: false

eventThresholdRsrpNr:
type: integer
minimum: 0
maximum: 127
description: >
  This IE shall be present if the report trigger parameter is configured for A2 event reporting or A2 event triggered periodic reporting and the job type parameter is configured for Immediate MDT, combined Immediate MDT and Trace, Immediate MDT and 5GC UE level measurements or Trace, Immediate MDT and 5GC UE level measurements in NR. When present, this IE shall indicate the Event Threshold for RSRP, and the value shall be between 0-127.
eventThresholdRsrq:
type: integer
minimum: 0
maximum: 34
description: >
  This IE shall be present if the report trigger parameter is configured for A2 event reporting or A2 event triggered periodic reporting and the job type parameter is configured for Immediate MDT or combined Immediate MDT and Trace in LTE. When present, this IE shall indicate the Event Threshold for RSRQ, and the value shall be between 0-34.
eventThresholdRsrqNr:
type: integer
minimum: 0
maximum: 127
description: >
  This IE shall be present if the report trigger parameter is configured for A2 event reporting or A2 event triggered periodic reporting and the job type parameter is configured for Immediate MDT, combined Immediate MDT and Trace, Immediate MDT and 5GC UE level measurements or Trace, Immediate MDT and 5GC UE level measurements in NR. When present, this IE shall indicate the Event Threshold for RSRQ, and the value shall be between 0-127.
eventList:
type: array
items:
  $ref: '#/components/schemas/EventForMdt'
minItems: 1
loggingInterval:
  $ref: '#/components/schemas/LoggingIntervalMdt'
loggingIntervalNr:
  $ref: '#/components/schemas/LoggingIntervalNrMdt'
loggingDuration:
  $ref: '#/components/schemas/LoggingDurationMdt'
loggingDurationNr:
  $ref: '#/components/schemas/LoggingDurationNrMdt'
positioningMethod:
  $ref: '#/components/schemas/PositioningMethodMdt'
addPositioningMethodList:
type: array

```

```

    items:
      $ref: '#/components/schemas/PositioningMethodMdt'
    minItems: 1
  collectionPeriodRmmLte:
    $ref: '#/components/schemas/CollectionPeriodRmmLteMdt'
  collectionPeriodRmmNr:
    $ref: '#/components/schemas/CollectionPeriodRmmNrMdt'
  measurementPeriodLte:
    $ref: '#/components/schemas/MeasurementPeriodLteMdt'
  mdtAllowedPlmnIdList:
    type: array
    items:
      $ref: '#/components/schemas/PlmnId'
    minItems: 1
    maxItems: 16
  mbsfnAreaList:
    type: array
    items:
      $ref: '#/components/schemas/MbsfnArea'
    minItems: 1
    maxItems: 8
  interFreqTargetList:
    type: array
    items:
      $ref: '#/components/schemas/InterFreqTargetInfo'
    minItems: 1
    maxItems: 8
  eventThresholdSinrNr:
    type: integer
    minimum: 0
    maximum: 127
  bluetoothMeasurementNr:
    $ref: '#/components/schemas/BluetoothMeasurement'
  bluetoothMeasurementLte:
    $ref: '#/components/schemas/BluetoothMeasurement'
  wlanMeasurementNr:
    $ref: '#/components/schemas/WlanMeasurement'
  wlanMeasurementLte:
    $ref: '#/components/schemas/WlanMeasurement'
  sliceAreaScope:
    type: array
    items:
      $ref: '#/components/schemas/SliceScopePerPlmn'
    minItems: 1
    maxItems: 16

AreaScope:
  description: Contain the area based on Cells or Tracking Areas.
  type: object
  properties:
    eutraCellIdList:
      type: array
      items:
        $ref: '#/components/schemas/EutraCellId'
      minItems: 1
    nrCellIdList:
      type: array
      items:
        $ref: '#/components/schemas/NrCellId'
      minItems: 1
    tacList:
      type: array
      items:
        $ref: '#/components/schemas/Tac'
      minItems: 1
    tacInfoPerPlmn:
      type: object
      additionalProperties:
        $ref: '#/components/schemas/TacInfo'
      minProperties: 1
      description: >
        A map (list of key-value pairs) where PlmnId converted to a string serves as key
    cagInfoPerPlmn:
      type: object
      additionalProperties:
        $ref: '#/components/schemas/CagInfo'
      minProperties: 1
      description: >

```

```

    A map (list of key-value pairs) where PlmnId converted to a string serves as key
nidInfoPerPlmn:
  type: object
  additionalProperties:
    $ref: '#/components/schemas/NidInfo'
  minProperties: 1
  description: >
    A map (list of key-value pairs) where PlmnId converted to a string serves as key
cellIdNidInfoPerPlmn:
  type: object
  additionalProperties:
    $ref: '#/components/schemas/CellIdNidInfo'
  minProperties: 1
  description: >
    A map (list of key-value pairs) where PlmnId converted to a string serves as key
tacNidInfoPerPlmn:
  type: object
  additionalProperties:
    $ref: '#/components/schemas/TacNidInfo'
  minProperties: 1
  description: >
    A map (list of key-value pairs) where PlmnId converted to a string serves as key
cagList:
  type: array
  items:
    $ref: '#/components/schemas/CagId'
  minItems: 1

TacInfo:
  description: contains tracking area information (tracking area codes).
  type: object
  required:
    - tacList
  properties:
    tacList:
      type: array
      items:
        $ref: '#/components/schemas/Tac'
      minItems: 1

CagInfo:
  description: contains CAG IDs.
  type: object
  required:
    - cagList
  properties:
    cagList:
      type: array
      items:
        $ref: '#/components/schemas/CagId'
      minItems: 1

NidInfo:
  description: contains NIDs.
  type: object
  required:
    - nidList
  properties:
    nidList:
      type: array
      items:
        $ref: '#/components/schemas/Nid'
      minItems: 1

CellIdNidInfo:
  description: contains a list of the NR Cell Identities in SNPN.
  type: object
  required:
    - cellIdNidList
  properties:
    cellIdNidList:
      type: array
      items:
        $ref: '#/components/schemas/CellIdNid'
      minItems: 1

CellIdNid:
  description: contains a NR Cell Identity and Network Identity.

```

```
type: object
required:
- cellId
- nid
properties:
  cellId:
    $ref: '#/components/schemas/NrCellId'
  nid:
    $ref: '#/components/schemas/Nid'
```

TacNidInfo:

```
description: contains a list of the tracking area codes in SNPN.
type: object
required:
- tacNidList
properties:
  tacNidList:
    type: array
    items:
      $ref: '#/components/schemas/TacNid'
    minItems: 1
```

TacNid:

```
description: contains a tracking area code and Network Identity.
type: object
required:
- tac
- nid
properties:
  tac:
    $ref: '#/components/schemas/Tac'
  nid:
    $ref: '#/components/schemas/Nid'
```

MbsfnArea:

```
description: Contains an MBSFN area information.
type: object
properties:
  mbsfnAreaId:
    type: integer
    minimum: 0
    maximum: 255
    description: This IE shall contain the MBSFN Area ID.
  carrierFrequency:
    type: integer
    minimum: 0
    maximum: 262143
    description: When present, this IE shall contain the Carrier Frequency (EARFCN).
```

InterFreqTargetInfo:

```
description: Indicates the Inter Frequency Target information.
required:
- dlCarrierFreq
type: object
properties:
  dlCarrierFreq:
    $ref: '#/components/schemas/ArfcnValueNR'
  cellIdList:
    type: array
    items:
      $ref: '#/components/schemas/PhysCellId'
    minItems: 1
    maxItems: 32
  description: >
    When present, this IE shall contain a list of the physical cell identities where the
    UE is requested to perform measurement logging for the indicated frequency.
```

QmcConfigInfo:

```
description: >
  It contains the configuration information for signaling-based activation of the
  Quality of Experience (QoE) Measurements Collection (QMC) functionality.
type: object
required:
- qoeReference
properties:
  qoeReference:
    $ref: '#/components/schemas/QoeReference'
```

```

serviceType:
  $ref: '#/components/schemas/QoeServiceType'
sliceScope:
  type: array
  items:
    $ref: '#/components/schemas/Snssai'
  minItems: 1
areaScope:
  $ref: '#/components/schemas/QmcAreaScope'
qoeCollectionEntityAddress:
  $ref: '#/components/schemas/IpAddr'
qoeTarget:
  $ref: '#/components/schemas/QoeTarget'
mdtAlignmentInfo:
  $ref: '#/components/schemas/MdtAlignmentInfo'
availableRanVisibleQoeMetrics:
  type: array
  items:
    $ref: '#/components/schemas/AvailableRanVisibleQoeMetric'
  minItems: 1
containerForAppLayerMeasConfig:
  $ref: '#/components/schemas/Bytes'
mbsCommunicationServiceType:
  $ref: '#/components/schemas/MbsServiceType'

QmcAreaScope:
  description: >
    This IE contains the area in Cells or Tracking Areas where the QMC data collection
    shall take place.
  type: object
  properties:
    nrCellIdList:
      type: array
      items:
        $ref: '#/components/schemas/NrCellId'
      minItems: 1
    tacList:
      type: array
      items:
        $ref: '#/components/schemas/Tac'
      minItems: 1
    taiList:
      type: array
      items:
        $ref: '#/components/schemas/Tai'
      minItems: 1
    plmnList:
      type: array
      items:
        $ref: '#/components/schemas/PlmnId'
      minItems: 1

QoeTarget:
  description: >
    This parameter specifies the target object (individual UE) for the QMC in case of
    signalling based QMC. It shall be able to carry an IMSI or a SUPI.
  type: object
  properties:
    supi:
      $ref: '#/components/schemas/Supi'
    imsi:
      $ref: '#/components/schemas/Imsi'

UeLevelMeasurementsConfiguration:
  description: 5GC UE Level Measurements configuration.
  type: object
  required:
    - jobType
    - ueLevelMeasurementsList
  properties:
    jobType:
      $ref: '#/components/schemas/JobType'
    ueLevelMeasurementsList:
      type: array
      items:
        $ref: '#/components/schemas/MeasurementType'
      minItems: 1

```

```

    granularityPeriod:
      $ref: '#/components/schemas/DurationSec'

BluetoothMeasurement:
  description: contains the bluetooth measurements to be collected for UE.
  type: object
  properties:
    measurementNameList:
      type: array
      items:
        $ref: '#/components/schemas/MeasurementName'
      minItems: 1
      maxItems: 4
    bluetoothRssi:
      $ref: '#/components/schemas/BluetoothRssi'

WlanMeasurement:
  description: contains the WLAN measurements to be collected for UE.
  type: object
  properties:
    measurementNameList:
      type: array
      items:
        $ref: '#/components/schemas/MeasurementName'
      minItems: 1
      maxItems: 4
    wlanRssi:
      $ref: '#/components/schemas/WlanRssi'
    wlanRtt:
      $ref: '#/components/schemas/WlanRtt'

MeasurementName:
  description: contains the measurement name for measurement collection.
  type: object
  properties:
    bluetoothName:
      type: string
    wlanName:
      type: string

SliceScopePerPlmn:
  description: contains the list of network slices for MDT per PLMN.
  type: object
  required:
    - plmn
    - sliceScope
  properties:
    plmn:
      $ref: '#/components/schemas/PlmnId'
    sliceScope:
      type: array
      items:
        $ref: '#/components/schemas/Snssai'
      minItems: 1
      maxItems: 1024

# Data Types related to 5G ODB as defined in clause 5.7

#
# SIMPLE DATA TYPES
#
#
# Enumerations
#
RoamingOdb:
  anyOf:
    - type: string
      enum:
        - OUTSIDE_HOME_PLMN
        - OUTSIDE_HOME_PLMN_COUNTRY
    - type: string
  description: >
    The enumeration RoamingOdb defines the Barring of Roaming as. See 3GPP TS 23.015 for further
    description. It shall comply with the provisions defined in table 5.7.3.1-1.

```

```

OdbPacketServices:
  anyOf:
    - anyOf:
      - type: string
        enum:
          - ALL_PACKET_SERVICES
          - ROAMER_ACCESS_HPLMN_AP
          - ROAMER_ACCESS_VPLMN_AP
      - type: string
        - $ref: '#/components/schemas/NullValue'
  description: >
    The enumeration OdbPacketServices defines the Barring of Packet Oriented Services.
    See 3GPP TS 23.015 for further description. It shall comply with the provisions defined
    in table 5.7.3.2-1

#
# STRUCTURED DATA TYPES
#

OdbData:
  description: Contains information regarding operater determined barring.
  type: object
  properties:
    roamingOdb:
      $ref: '#/components/schemas/RoamingOdb'

#
# Data Types related to Charging as defined in clause 5.8
#

#
# SIMPLE DATA TYPES
#

ChargingId:
  deprecated: true
  type: integer
  minimum: 0
  maximum: 4294967295 #(2^32)-1
  description: >
    Integer where the allowed values correspond to the value range of an unsigned 32-bit
    integer.

SmfChargingId:
  description: String based Charging ID
  type: string
  pattern: '^([0-9]{1}[0-9]{0,9})\.smf-([0-9a-f]{8}-[0-9a-f]{4}-[0-9a-f]{4}-[0-9a-f]{4}-[0-9a-f]{12})$'

ApplicationChargingId:
  type: string
  description: >
    Application provided charging identifier allowing correlation of charging information.

RatingGroup:
  $ref: '#/components/schemas/Uint32'

ServiceId:
  $ref: '#/components/schemas/Uint32'

#
# Enumerations
#

#
# STRUCTURED DATA TYPES
#

SecondaryRatUsageReport:
  description: Secondary RAT Usage Report to report usage data for a secondary RAT for QoS
  flows.
  type: object
  properties:
    secondaryRatType:
      $ref: '#/components/schemas/RatType'
    qosFlowsUsageData:
      type: array
      items:

```

```
    $ref: '#/components/schemas/QosFlowUsageReport'
  minItems: 1
  required:
  - secondaryRatType
  - qosFlowsUsageData

QosFlowUsageReport:
  description: Contains QoS flows usage data information.
  type: object
  properties:
    qfi:
      $ref: '#/components/schemas/Qfi'
    startTimeStamp:
      $ref: '#/components/schemas/DateTime'
    endTimeStamp:
      $ref: '#/components/schemas/DateTime'
    downlinkVolume:
      $ref: '#/components/schemas/Int64'
    uplinkVolume:
      $ref: '#/components/schemas/Int64'
  required:
  - qfi
  - startTimeStamp
  - endTimeStamp
  - downlinkVolume
  - uplinkVolume

SecondaryRatUsageInfo:
  description: >
    Secondary RAT Usage Information to report usage data for a secondary RAT for QoS flows
    and/or the whole PDU session.
  type: object
  properties:
    secondaryRatType:
      $ref: '#/components/schemas/RatType'
    qosFlowsUsageData:
      type: array
      items:
        $ref: '#/components/schemas/QosFlowUsageReport'
      minItems: 1
    pduSessionUsageData:
      type: array
      items:
        $ref: '#/components/schemas/VolumeTimedReport'
      minItems: 1
  required:
  - secondaryRatType

VolumeTimedReport:
  description: Contains Usage data information.
  type: object
  properties:
    startTimeStamp:
      $ref: '#/components/schemas/DateTime'
    endTimeStamp:
      $ref: '#/components/schemas/DateTime'
    downlinkVolume:
      $ref: '#/components/schemas/Int64'
    uplinkVolume:
      $ref: '#/components/schemas/Int64'
  required:
  - startTimeStamp
  - endTimeStamp
  - downlinkVolume
  - uplinkVolume

# Data Types related to MBS as defined in clause 5.9
#
#
# SIMPLE DATA TYPES
#
#
AreaSessionId:
  $ref: '#/components/schemas/Uint16'
```

```

AreaSessionPolicyId:
  $ref: '#/components/schemas/Uint16'

MbsFsaId:
  description: MBS Frequency Selection Area Identifier
  type: string
  pattern: '^[A-Fa-f0-9]{6}$'

IntendedServiceArea:
  $ref: '#/components/schemas/Bytes'

#
# Enumerations
#
#
MbsServiceType:
  description: Indicates the MBS service type of an MBS session
  anyOf:
    - type: string
      enum:
        - MULTICAST
        - BROADCAST
    - type: string

MbsSessionActivityStatus:
  description: Indicates the MBS session's activity status
  anyOf:
    - type: string
      enum:
        - ACTIVE
        - INACTIVE
    - type: string

MbsSessionEventType:
  description: MBS Session Event Type
  anyOf:
    - type: string
      enum:
        - MBS_REL_TMGI_EXPIRY
        - BROADCAST_DELIVERY_STATUS
        - INGRESS_TUNNEL_ADD_CHANGE
    - type: string

BroadcastDeliveryStatus:
  description: Broadcast MBS Session's Delivery Status
  anyOf:
    - type: string
      enum:
        - STARTED
        - TERMINATED
    - type: string

NrRedCapUeInfo:
  description: >
    Indicates whether the broadcast MBS session is intended only for NR (e)RedCap UEs,
    only for UEs that are neither NR RedCap UEs nor NR RedCap UEs, or for any kind of UE.
  anyOf:
    - type: string
      enum:
        - NR_REDCAP_UE_ONLY # NR RedCap UEs and NR eRedCap UEs
        - BOTH_NR_REDCAP_UE_AND_NON_REDCAP_UE # any kind of UEs
        - NON_REDCAP_UE_ONLY # neither NR RedCap UEs nor NR eRedCap UEs
    - type: string

#
# STRUCTURED DATA TYPES
#
MbsSessionId:
  description: MBS Session Identifier
  type: object
  properties:
    tmgi:
      $ref: '#/components/schemas/Tmgi'
    ssm:
      $ref: '#/components/schemas/Ssm'
    nid:

```

```
    $ref: '#/components/schemas/Nid'
  anyOf:
    - required: [ tmgi ]
    - required: [ ssm ]

Tmgi:
  description: Temporary Mobile Group Identity
  type: object
  properties:
    mbsServiceId:
      type: string
      pattern: '^[A-Za-f0-9]{6}$'
      description: MBS Service ID
    plmnId:
      $ref: '#/components/schemas/PlmnId'
  required:
    - mbsServiceId
    - plmnId

Ssm:
  description: Source specific IP multicast address
  type: object
  properties:
    sourceIpAddr:
      $ref: '#/components/schemas/IpAddr'
    destIpAddr:
      $ref: '#/components/schemas/IpAddr'
  required:
    - sourceIpAddr
    - destIpAddr

MbsServiceArea:
  description: MBS Service Area
  type: object
  properties:
    ncgiList:
      type: array
      items:
        $ref: '#/components/schemas/NcgiTai'
      minItems: 1
      description: List of NR cell Ids
    taiList:
      type: array
      items:
        $ref: '#/components/schemas/Tai'
      minItems: 1
      description: List of tracking area Ids
    intendedServAreaList:
      type: array
      items:
        $ref: '#/components/schemas/IntendedServiceArea'
      minItems: 1
      description: NR NTN Intended Service Area
  anyOf:
    - required: [ ncgiList ]
    - required: [ taiList ]

NcgiTai:
  description: List of NR cell ids, with their pertaining TAIs
  type: object
  properties:
    tai:
      $ref: '#/components/schemas/Tai'
    cellList:
      type: array
      items:
        $ref: '#/components/schemas/Ncgi'
      minItems: 1
      description: List of List of NR cell ids
  required:
    - tai
    - cellList

MbsSession:
  description: Individual MBS session
  type: object
  properties:
    mbsSessionId:
```

```

    $ref: '#/components/schemas/MbsSessionId'
tmgiAllocReq:
  type: boolean
  default: false
  writeOnly: true
tmgi:
  allOf:
    - $ref: '#/components/schemas/Tmgi'
  readOnly: true
expirationTime:
  allOf:
    - $ref: '#/components/schemas/DateTime'
  readOnly: true
serviceType:
  allOf:
    - $ref: '#/components/schemas/MbsServiceType'
  writeOnly: true
locationDependent:
  type: boolean
  default: false
areaSessionId:
  allOf:
    - $ref: '#/components/schemas/AreaSessionId'
  readOnly: true
ingressTunAddrReq:
  type: boolean
  default: false
  writeOnly: true
ingressTunAddr:
  type: array
  items:
    $ref: '#/components/schemas/TunnelAddress'
  minItems: 1
  readOnly: true
ssm:
  allOf:
    - $ref: '#/components/schemas/Ssm'
  writeOnly: true
mbsServiceArea:
  allOf:
    - $ref: '#/components/schemas/MbsServiceArea'
  writeOnly: true
extMbsServiceArea:
  allOf:
    - $ref: '#/components/schemas/ExternalMbsServiceArea'
  writeOnly: true
redMbsServArea:
  allOf:
    - $ref: '#/components/schemas/MbsServiceArea'
  readOnly: true
extRedMbsServArea:
  allOf:
    - $ref: '#/components/schemas/ExternalMbsServiceArea'
  readOnly: true
dnn:
  allOf:
    - $ref: '#/components/schemas/Dnn'
  writeOnly: true
snssai:
  allOf:
    - $ref: '#/components/schemas/Snssai'
  writeOnly: true
activationTime:
  deprecated: true
  format: date-time
  type: string
startTime:
  $ref: '#/components/schemas/DateTime'
terminationTime:
  $ref: '#/components/schemas/DateTime'
mbsServInfo:
  $ref: '#/components/schemas/MbsServiceInfo'
mbsSessionSubsc:
  $ref: '#/components/schemas/MbsSessionSubscription'
activityStatus:
  $ref: '#/components/schemas/MbsSessionActivityStatus'
anyUeInd:
  type: boolean

```

```

    default: false
    writeOnly: true
    mbsFsaIdList:
      type: array
      items:
        $ref: '#/components/schemas/MbsFsaId'
      minItems: 1
    associatedSessionId:
      $ref: '#/components/schemas/AssociatedSessionId'
    nrRedCapUeInfo:
      $ref: '#/components/schemas/NrRedCapUeInfo'
    required:
      - serviceType
    anyOf:
      - required: [ mbsSessionId ]
      - required: [ tmgiAllocReq ]
    not:
      required: [ redMbsServArea, extRedMbsServArea]

MbsSessionSubscription:
  description: MBS session subscription
  type: object
  properties:
    mbsSessionId:
      $ref: '#/components/schemas/MbsSessionId'
    areaSessionId:
      $ref: '#/components/schemas/AreaSessionId'
    eventList:
      type: array
      items:
        $ref: '#/components/schemas/MbsSessionEvent'
      minItems: 1
    notifyUri:
      $ref: '#/components/schemas/Uri'
    notifyCorrelationId:
      type: string
    expiryTime:
      $ref: '#/components/schemas/DateTime'
    nfcInstanceId:
      $ref: '#/components/schemas/NfInstanceId'
    mbsSessionSubscUri:
      allOf:
        - $ref: '#/components/schemas/Uri'
      readOnly: true
    required:
      - eventList
      - notifyUri

MbsSessionEventReportList:
  description: MBS session event report list
  type: object
  properties:
    eventReportList:
      type: array
      items:
        $ref: '#/components/schemas/MbsSessionEventReport'
      minItems: 1
    notifyCorrelationId:
      type: string
    required:
      - eventReportList

MbsSessionEvent:
  description: MBS session event
  type: object
  properties:
    eventType:
      $ref: '#/components/schemas/MbsSessionEventType'
    required:
      - eventType

MbsSessionEventReport:
  description: MBS session event report
  type: object
  properties:
    eventType:
      $ref: '#/components/schemas/MbsSessionEventType'

```

```

    timeStamp:
      $ref: '#/components/schemas/DateTime'
    ingressTunAddrInfo:
      $ref: '#/components/schemas/IngressTunAddrInfo'
    broadcastDelStatus:
      $ref: '#/components/schemas/BroadcastDeliveryStatus'
    required:
      - eventType

ExternalMbsServiceArea:
  description: List of geographic area or list of civic address info for MBS Service Area
  type: object
  properties:
    geographicAreaList:
      type: array
      items:
        $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicArea'
      minItems: 1
    civicAddressList:
      type: array
      items:
        $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/CivicAddress'
      minItems: 1
  oneOf:
    - required: [ geographicAreaList ]
    - required: [ civicAddressList ]

MbsSecurityContext:
  description: MBS security context consisting of MSK/MTK(s) and associated IDs
  type: object
  properties:
    keyList:
      description: >
        A map (list of key-value pairs) where a (unique) valid JSON string serves
        as key of MbsSecurityContext
      type: object
      additionalProperties:
        $ref: '#/components/schemas/MbsKeyInfo'
      minProperties: 1
  required:
    - keyList

MbsKeyInfo:
  description: MBS Security Key Data Structure
  type: object
  properties:
    keyDomainId:
      $ref: '#/components/schemas/Bytes'
    mskId:
      $ref: '#/components/schemas/Bytes'
    msk:
      $ref: '#/components/schemas/Bytes'
    mskLifetime:
      $ref: '#/components/schemas/DateTime'
    mtkId:
      $ref: '#/components/schemas/Bytes'
    mtk:
      $ref: '#/components/schemas/Bytes'
  required:
    - keyDomainId
    - mskId

IngressTunAddrInfo:
  description: Ingress Tunnel Address Information
  type: object
  properties:
    ingressTunAddr:
      type: array
      items:
        $ref: '#/components/schemas/TunnelAddress'
      minItems: 1
  required:
    - ingressTunAddr

MbsServiceAreaInfo:

```

```

description: MBS Service Area Information for location dependent MBS session
type: object
properties:
  areaSessionId:
    $ref: '#/components/schemas/AreaSessionId'
  mbsServiceArea:
    $ref: '#/components/schemas/MbsServiceArea'
required:
  - areaSessionId
  - mbsServiceArea

MbsServiceInfo:
description: Represent MBS Service Information.
type: object
properties:
  mbsMediaComps:
    description: >
      The key of the map is the "mbsMedCompNum" attribute of the corresponding MbsMediaCompRm
      data structure provided as a map entry.
    type: object
    additionalProperties:
      $ref: '#/components/schemas/MbsMediaCompRm'
    minProperties: 1
  mbsSdfResPrio:
    $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/ReservPriority'
  afAppId:
    $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/AfAppId'
  mbsSessionAmbr:
    $ref: '#/components/schemas/BitRate'
required:
  - mbsMediaComps

MbsMediaComp:
description: Represents an MBS Media Component.
type: object
properties:
  mbsMedCompNum:
    type: integer
  mbsFlowDescs:
    type: array
    items:
      $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/FlowDescription'
    minItems: 1
  mbsSdfResPrio:
    $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/ReservPriority'
  mbsMediaInfo:
    $ref: '#/components/schemas/MbsMediaInfo'
  qosRef:
    type: string
  mbsQoSReq:
    $ref: '#/components/schemas/MbsQoSReq'
required:
  - mbsMedCompNum

MbsMediaCompRm:
description: >
  This data type is defined in the same way as the MbsMediaComp data type, but with the
  OpenAPI nullable property set to true.
anyOf:
  - $ref: '#/components/schemas/MbsMediaComp'
  - $ref: '#/components/schemas/NullValue'

MbsQoSReq:
description: Represent MBS QoS requirements.
type: object
properties:
  5qi:
    $ref: '#/components/schemas/5Qi'
  guarBitRate:
    $ref: '#/components/schemas/BitRate'
  maxBitRate:
    $ref: '#/components/schemas/BitRate'
  averWindow:
    $ref: '#/components/schemas/AverWindow'
  reqMbsArp:
    $ref: '#/components/schemas/Arp'
required:
  - 5qi

```

```
MbsMediaInfo:
  description: Represent MBS Media Information.
  type: object
  properties:
    mbsMedType:
      $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/MediaType'
    maxReqMbsBwDl:
      $ref: '#/components/schemas/BitRate'
    minReqMbsBwDl:
      $ref: '#/components/schemas/BitRate'
    codecs:
      type: array
      items:
        $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/CodecData'
      minItems: 1
      maxItems: 2
```

```
AssociatedSessionId:
  description: an associated Session Id used in MOCN
  anyOf:
    - $ref: '#/components/schemas/Ssm'
    - type: string
```

```
# Data Types related to Time Synchronization as defined in clause 5.10
#
```

```
#
# SIMPLE DATA TYPES
#
#
```

```
#
# Enumerations
#
#
```

```
SynchronizationState:
  description: Indicates the Synchronization State.
  anyOf:
    - type: string
      enum:
        - LOCKED
        - HOLDOVER
        - FREERUN
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.
```

```
TimeSource:
  description: Indicates the Time Source.
  anyOf:
    - type: string
      enum:
        - SYNC_E
        - PTP
        - GNSS
        - ATOMIC_CLOCK
        - TERRESTRIAL_RADIO
        - SERIAL_TIME_CODE
        - NTP
        - HAND_SET
        - OTHER
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.
```

```
ClockQualityDetailLevel:
  description: Indicates the Clock Quality Detail Level.
  anyOf:
    - type: string
```

```

enum:
- CLOCK_QUALITY_METRICS
- ACCEPT_INDICATION
- type: string
description: >
  This string provides forward-compatibility with future
  extensions to the enumeration but is not used to encode
  content defined in the present version of this API.

```

```

ClockQualityDetailLevelRm:
description: >
  This data type is defined in the same way as the 'ClockQualityDetailLevel' data type,
  but with the OpenAPI 'nullable: true' property.
anyOf:
- $ref: '#/components/schemas/ClockQualityDetailLevel'
- $ref: '#/components/schemas/NullValue'

```

```

#
# STRUCTURED DATA TYPES
#

```

```

ClockQualityAcceptanceCriterion:
description: Contains a Clock Quality Acceptance Criterion.
type: object
properties:
  synchronizationState:
    type: array
    items:
      $ref: '#/components/schemas/SynchronizationState'
    minItems: 1
  clockQuality:
    $ref: '#/components/schemas/ClockQuality'
  parentTimeSource:
    type: array
    items:
      $ref: '#/components/schemas/TimeSource'
    minItems: 1

```

```

ClockQualityAcceptanceCriterionRm:
description: Contains a Clock Quality Acceptance Criterion.
type: object
nullable: true
properties:
  synchronizationState:
    type: array
    nullable: true
    items:
      $ref: '#/components/schemas/SynchronizationState'
    minItems: 1
  clockQuality:
    $ref: '#/components/schemas/ClockQualityRm'
  parentTimeSource:
    type: array
    nullable: true
    items:
      $ref: '#/components/schemas/TimeSource'
    minItems: 1

```

```

ClockQuality:
description: Contains Clock Quality.
type: object
properties:
  traceabilityToGnss:
    type: boolean
  traceabilityToUtc:
    type: boolean
  frequencyStability:
    $ref: '#/components/schemas/Uint16'
  clockAccuracyIndex:
    type: string
    pattern: '^[A-Za-f0-9]{2}$'
  clockAccuracyValue:
    type: integer
    minimum: 1
    maximum: 40000000

```

```

ClockQualityRm:

```

```
description: "ClockQuality with 'nullable: true' property"
type: object
nullable: true
properties:
  traceabilityToGnss:
    type: boolean
  traceabilityToUtc:
    type: boolean
  frequencyStability:
    $ref: '#/components/schemas/Uint16Rm'
  clockAccuracyIndex:
    type: string
    nullable: true
    pattern: '^[A-Za-f0-9]{2}$'
  clockAccuracyValue:
    type: integer
    nullable: true
    minimum: 1
    maximum: 40000000
```

```
# Data Types related to IMS SBA as defined in clause 5.11
#
```

```
#
# SIMPLE DATA TYPES
#
#
```

```
SessionId:
  description: IMS Session Identifier
  type: string
```

```
Fingerprint:
  description: The certificate fingerprint for the DTLS association.
  type: string
  pattern: '^(SHA-1|SHA-224|SHA-256|SHA-384|SHA-512|MD5|MD2)\s[0-9A-F]{2}(:[0-9A-F]{2})+$$'
```

```
MediaId:
  description: IMS Media Flow Identifier
  type: string
```

```
MaxMessageSize:
  description: Maximum SCTP user message size
  type: integer
  maximum: 64
  default: 64
```

```
TlsId:
  description: The TLS ID for the media stream.
  type: string
  pattern: '^[A-Za-z0-9+/_-]{20,255}$'
```

```
ImsTranspInfo:
  description: IMS object to carry transparent information for IMS Exposure services.
  type: object
```

```
#
# Enumerations
#
#
```

```
MediaResourceType:
  description: Indicates the Media Resource type
  anyOf:
    - type: string
      enum:
        - DC
        - AUDIO
        - VIDEO
    - type: string
```

```
MediaProxy:
  description: Media Proxy Configuration applicable to the media flow
  anyOf:
```

```
- type: string
  enum:
    - HTTP_PROXY
    - UDP_PROXY
    - DC_APPLICATION_PROXY
- type: string

SecuritySetup:
  description: security setup of the DTLS connection
  anyOf:
    - type: string
      enum:
        - ACTIVE
        - PASSIVE
        - ACTPASS
    - type: string

BdcUsedBy:
  description: The party uses the bootstrap data channel in the media description
  anyOf:
    - type: string
      enum:
        - SENDER
        - RECEIVER
    - type: string

AdcEndpointType:
  description: The remote endpoint type of the application data channel
  anyOf:
    - type: string
      enum:
        - UE
        - SERVER
    - type: string

ImsEvent:
  description: The IMS events
  anyOf:
    - type: string
      enum:
        - ADC_ESTABLISHMENT
        - ADC_RELEASE
        - BDC_ESTABLISHMENT
        - BDC_RELEASE
        - ADC_IWK_ESTABLISHMENT
    - type: string

AdcStatus:
  description: ADC event status.
  anyOf:
    - type: string
      enum:
        - ADC_ESTABLISHED
        - ADC_RELEASED
        - ADC_IWK_ESTABLISHED
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.

BdcStatus:
  description: BDC event status.
  anyOf:
    - type: string
      enum:
        - BDC_ESTABLISHED
        - BDC_RELEASED
    - type: string
      description: >
        This string provides forward-compatibility with future
        extensions to the enumeration but is not used to encode
        content defined in the present version of this API.

ImsReportMode:
  description: Ims event report mode.
  anyOf:
```

```

- type: string
  enum:
    - ON_EVENT_DETECTION
    - PERIODIC
- type: string
  description: >
    This string provides forward-compatibility with future
    extensions to the enumeration but is not used to encode
    content defined in the present version of this API.

```

```

RenderingMode:
  description: The rendering mode for avatar media
  anyOf:
    - type: string
      enum:
        - UE_CENTRIC
        - NET_CENTRIC_MF
        - NET_CENTRIC_DCAS
    - type: string

```

```

#
# STRUCTURED DATA TYPES
#

```

```

DcEndpoint:
  description: Endpoint for Data Channel
  type: object
  properties:
    sctpPort:
      type: integer
      maximum: 65535
      minimum: 0
      description: Local or remote port for Data Channel
    fingerprint:
      deprecated: true
      allOf:
        - $ref: '#/components/schemas/Fingerprint'
    fingerprints:
      type: array
      items:
        $ref: '#/components/schemas/Fingerprint'
      minItems: 1
    tlsId:
      $ref: '#/components/schemas/TlsId'
    securitySetup:
      $ref: '#/components/schemas/SecuritySetup'

```

```

DcStream:
  description: Data Channel mapping and configuration information
  type: object
  not:
    required: [maxRetry, maxTime]
  properties:
    streamId:
      type: integer
      maximum: 65535
      default: 0
      description: Stream identifier for Data Channel
    subprotocol:
      type: string
      pattern: '^[A-Za-f0-9]{20}$'
      description: Subprotocol of the SCTP stream
    order:
      type: boolean
    maxRetry:
      type: integer
      default: 0
      description: maximal number of the times a message will be retransmitted
    maxTime:
      type: integer
      default: 0
      description: >
        maximal lifetime in milliseconds after which a message will no longer be
        transmitted or retransmitted
    priority:
      type: integer
      default: 256
      description: priority of data channel relative to other data channels

```

```

ReplaceHttpRequest:
  description: replacement HTTP URL per stream
  type: object
  properties:
    replaceHttpRequest:
      $ref: '#/components/schemas/Uri'
    streamId:
      type: integer
      maximum: 65535
      default: 0
      description: Stream identifier for Data Channel

```

```

Endpoint:
  description: Represents the IP endpoint.
  type: object
  required:
    - ip
    - transport
    - portNumber
  properties:
    ip:
      $ref: '#/components/schemas/IpAddr'
    transport:
      $ref: '#/components/schemas/TransportProtocol'
    portNumber:
      $ref: '#/components/schemas/UInteger'

```

```

AppBindingInfo:
  description: Represents the application binding information.
  type: object
  required:
    - applicationId
  properties:
    applicationId:
      type: string
      description: application binding information of the Data Channel.
    appDcInfo:
      deprecated: true
      allOf:
        - $ref: '#/components/schemas/AppDcInfo'
    appDcInfoList:
      type: array
      items:
        $ref: '#/components/schemas/AppDcInfo'
      minItems: 1

```

```

AppDcInfo:
  description: Represents the application data channel is intended towards to a server or the
  remote UE.
  type: object
  required:
    - streamId
  properties:
    streamId:
      type: integer
    adcEndpointType:
      $ref: '#/components/schemas/AdcEndpointType'

```

```

MdcEndpoint:
  description: Endpoint for MDC1 and MDC2 interface
  type: object
  required:
    - ip
    - portNumber
  properties:
    ip:
      $ref: '#/components/schemas/IpAddr'
    portNumber:
      $ref: '#/components/schemas/UInteger'
    sctpPort:
      type: integer
      maximum: 65535
      minimum: 0
      description: Port number for SCTP connection over DTLS
    fingerprint:

```

```

    deprecated: true
    allof:
      - $ref: '#/components/schemas/Fingerprint'
  fingerprints:
    type: array
    items:
      $ref: '#/components/schemas/Fingerprint'
    minItems: 1
  tlsId:
    $ref: '#/components/schemas/TlsId'
  securitySetup:
    $ref: '#/components/schemas/SecuritySetup'

ImsReportingOptions:
  description: Ims event reporting options.
  type: object
  properties:
    reportMode:
      $ref: '#/components/schemas/ImsReportMode'
    oneTimeReport:
      type: boolean
    oneTimeNotification:
      type: boolean
    maxNumOfReports:
      type: integer
    reportPeriod:
      $ref: '#/components/schemas/DurationSec'
    expiry:
      $ref: '#/components/schemas/DateTime'

ImsEventConfiguration:
  description: Ims event configuration information.
  type: object
  required:
    - imsEvent
  properties:
    imsEvent:
      $ref: '#/components/schemas/ImsEvent'
    eventInfo:
      $ref: '#/components/schemas/EventInformation'
    reqCurrentStatus:
      type: boolean
    imsEventFilters:
      type: array
      items:
        $ref: '#/components/schemas/ImsEventFilter'
      minItems: 1

EventInformation:
  description: Ims event information.
  type: object
  properties:
    imsTranspEventConfig:
      $ref: '#/components/schemas/ImsTranspInfo'

ImsEventFilter:
  description: Conditions to match specific Ims event.
  type: object
  properties:
    callingId:
      type: string
      pattern: '^((sip|([a-zA-Z0-9_-.!*()&=+$,;?\\/]+)\\@[([A-Za-z0-9]+([-A-Za-z0-9]+)\\.)+[a-z]{2,}|tel|\\+[0-9]{5,15}))$'
    calledId:
      type: string
      pattern: '^((sip|([a-zA-Z0-9_-.!*()&=+$,;?\\/]+)\\@[([A-Za-z0-9]+([-A-Za-z0-9]+)\\.)+[a-z]{2,}|tel|\\+[0-9]{5,15}))$'
    appBindingInfo:
      $ref: '#/components/schemas/AppBindingInfo'
    sessionId:
      $ref: '#/components/schemas/SessionId'
    imsTranspFilter:
      $ref: '#/components/schemas/ImsTranspInfo'

ImsEventReport:
  description: Ims event report.
  type: object
  required:
    - imsEvent

```

```

properties:
  imsEvent:
    $ref: '#/components/schemas/ImsEvent'
  eventReport:
    $ref: '#/components/schemas/ImsEventReportInfo'
  sessionId:
    $ref: '#/components/schemas/SessionId'

ImsEventReportInfo:
  description: Ims event report specific information.
  type: object
  properties:
    adcReport:
      $ref: '#/components/schemas/AdcReport'
    bdcReport:
      $ref: '#/components/schemas/BdcReport'
    imsTranspEventReport:
      $ref: '#/components/schemas/ImsTranspInfo'

AdcReport:
  description: Application data channel report.
  type: object
  required:
    - adcStatus
  properties:
    adcStatus:
      $ref: '#/components/schemas/AdcStatus'

BdcReport:
  description: Bootstrap data channel report.
  type: object
  required:
    - bdcStatus
  properties:
    bdcStatus:
      $ref: '#/components/schemas/BdcStatus'

RcdProperties:
  description: Contains the RCD related parameters.
  type: object
  properties:
    rcdSrvAddr:
      $ref: '#/components/schemas/ServerAddressingInfo'
    rcdUrl:
      $ref: '#/components/schemas/Uri'
    rcdInfo:
      $ref: '#/components/schemas/RcdInformation'

RcdInformation:
  description: >
    Contains a collection of RCD properties as specified in IETF RFC 9796
    and represented as a jCard JSON object.
  type: object
  required:
    - identifProps
  properties:
    identifProps:
      $ref: '#/components/schemas/IdentificationProperties'
    delvAddrProps:
      $ref: '#/components/schemas/DeliveringAddrProperties'
    commsProps:
      $ref: '#/components/schemas/CommunicationsProperties'
    geogrProps:
      $ref: '#/components/schemas/GeographicalProperties'
    organProps:
      $ref: '#/components/schemas/OrganizationalProperties'
    explanProps:
      $ref: '#/components/schemas/ExplanatoryProperties'

IdentificationProperties:
  description: Represents the identity information of the entity associated with the jCard.
  type: object
  required:
    - fns
  properties:
    fns:
      description: >
        Represent the "fn" property which provides a formatted text corresponding to the

```

```
    name of the object the jCard represents as defined in IETF RFC 6350, section 6.2.1.
  type: array
  items:
    type: string
  minItems: 1
nProp:
  description: >
    Represent the "n" property which provides the components of the name of the object
    the jCard represents as defined as defined in IETF RFC 6350, section 6.2.2.
  type: string
nickNames:
  description: >
    Represent the "nickname" property which provides the text corresponding to the
    nickname of the object the jCard represents as defined in IETF RFC 6350, section 6.2.3.
  type: array
  items:
    type: string
  minItems: 1
photos:
  description: >
    Represent the "photo" property which provides image or photograph information that
    annotates some aspect of the object the jCard represents as defined in
    IETF RFC 6350, section 6.2.4.
  type: array
  items:
    $ref: '#/components/schemas/Uri'
  minItems: 1

DeliveringAddrProperties:
  description: >
    Represents the information related to the delivery address of the entity associated with
    the jCard.
  type: object
  properties:
    adrs:
      description: >
        Represent the "adr" property which provides the delivery address of the object the
        jCard represents as defined in IETF RFC 6350, section 6.3.1.
      type: array
      items:
        type: string
      minItems: 1

CommunicationsProperties:
  description: Indicates how to communicate with the entity associated with the jCard.
  type: object
  properties:
    tels:
      description: >
        Represent the "tel" property which provides the telephone number for the object the
        jCard represents as defined in IETF RFC 6350, section 6.4.1.
      type: array
      items:
        type: string
      minItems: 1
    emails:
      description: >
        Represent the "email" property which provides the electronic mail address of the
        object the jCard represents as defined in IETF RFC 6350, section 6.4.2.
      type: array
      items:
        type: string
      minItems: 1
    langs:
      description: >
        Represent the "lang" property which provides the language(s) that may be used for
        communicating with the object the jCard represents as defined in IETF RFC 6350,
        section 6.4.4.
      type: array
      items:
        type: string
      minItems: 1

GeographicalProperties:
  description: >
    Represents the geographical information associated with the entity associated with
    the jCard.
  type: object
```

```

properties:
  tzs:
    description: >
      Represent the "tz" property which provides the time zone of the object the jCard
      represents as defined in IETF RFC 6350, section 6.5.1.
    type: array
    items:
      type: string
    minItems: 1
  geos:
    description: >
      Represent the "geo" property which provides the global positioning of the object the
      jCard represents as defined in IETF RFC 6350, section 6.5.2.
    type: array
    items:
      $ref: '#/components/schemas/Uri'
    minItems: 1

OrganizationalProperties:
  description: >
    Represents the information associated with characteristics of the organization or
    organizational units of the entity associated with the jCard.
  type: object
  properties:
    titles:
      description: >
        Represent the "title" property which has the intent of providing the position or job
        of the object the jCard represents as defined in IETF RFC 6350, section 6.6.1.
      type: array
      items:
        type: string
      minItems: 1
    roles:
      description: >
        Represent the "role" property which has the intent of providing the position or job
        of the object the jCard represents as defined in IETF RFC 6350, section 6.6.2.
      type: array
      items:
        type: string
      minItems: 1
    logos:
      description: >
        Represent the "logo" property which has the intent of specifying a graphic image of
        a logo associated with the object the jCard represents as defined in IETF RFC 6350,
        section 6.6.3.
      type: array
      items:
        $ref: '#/components/schemas/Uri'
      minItems: 1
    orgs:
      description: >
        Represent the "org" property which has the intent of specifying the organizational
        name and units of the object the jCard represents as defined in IETF RFC 6350,
        section 6.6.4.
      type: array
      items:
        type: string
      minItems: 1

ExplanatoryProperties:
  description: >
    Indicates an additional information such as an application category information or notes
    that are specific to the entity associated with the jCard.
  type: object
  required:
  - version
  properties:
    categories:
      description: >
        Represent the "categories" property which specifies application category information
        about the object the jCard represents as defined in IETF RFC 6350, section 6.7.1.
      type: array
      items:
        type: string
      minItems: 1
    notes:
      description: >
        Represent the "note" property which specifies supplemental information or a comment

```

```

    about the object the jCard represents as defined in IETF RFC 6350, section 6.7.2.
  type: array
  items:
    type: string
  minItems: 1
  sounds:
    description: >
      Represent the "sound" property which specifies digital sound content information
      that annotates some aspect of the object the jCard represents as defined in
      IETF RFC 6350, section 6.7.5.
    type: array
    items:
      $ref: '#/components/schemas/Uri'
    minItems: 1
  uid:
    $ref: '#/components/schemas/Uri'
  urls:
    description: >
      Represent the "url" property which specifies a uniform resource locator associated
      with the object the jCard represents as defined in IETF RFC 6350, section 6.7.8.
    type: array
    items:
      $ref: '#/components/schemas/Uri'
    minItems: 1
  version:
    description: >
      Represent the "version" property which specifies the version of the vCard
      specification used to format this vCard as defined in IETF RFC 6350, section 6.7.9.
    type: string

```

```

# Data Types related to Ambient IoT as defined in clause 5.12
#

```

```

#
# SIMPLE DATA TYPES
#
#

```

```

AiotAreaCode:
  description: Ambient IoT Area code.
  type: string
  pattern: '^[A-Fa-f0-9]{6}$'

```

```

AiotFilteringInformation:
  description: Ambient IoT Filtering Information.
  $ref: '#/components/schemas/Bytes'

```

```

AiotDevPermId:
  $ref: '#/components/schemas/Bytes'
  description: >
    String identifying the AIoT Device Permanent Identifier.

```

```

#
# STRUCTURED DATA TYPES
#

```

```

AiotArea:
  description: Contains a list of AIoT Area ID(s).
  type: object
  properties:
    areaIds:
      type: array
      items:
        $ref: '#/components/schemas/AiotAreaId'
      minItems: 1
  required:
    - areaIds

```

```

AiotAreaId:
  description: AIoT Area ID.
  type: object
  properties:
    plmnId:
      $ref: '#/components/schemas/PlmnId'
    nid:

```

```

    $ref: '#/components/schemas/Nid'
  aiotAreaCode:
    $ref: '#/components/schemas/AiotAreaCode'
  required:
  - plmnID
  - aiotAreaCode

```

```

#
# HTTP responses
#

```

```

responses:
  '307':
    description: Temporary Redirect
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/RedirectResponse'
    headers:
      Location:
        description: 'The URI pointing to the resource located on the redirect target'
        required: true
        schema:
          type: string
      3gpp-Sbi-Target-Nf-Id:
        description: >
          'Identifier of target NF (service) instance towards which the request is redirected'
        schema:
          type: string
  '308':
    description: Permanent Redirect
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/RedirectResponse'
    headers:
      Location:
        description: 'The URI pointing to the resource located on the redirect target'
        required: true
        schema:
          type: string
      3gpp-Sbi-Target-Nf-Id:
        description: >
          'Identifier of target NF (service) instance towards which the request is redirected'
        schema:
          type: string
  '400':
    description: Bad request
    content:
      application/problem+json:
        schema:
          $ref: '#/components/schemas/ProblemDetails'
  '401':
    description: Unauthorized
    content:
      application/problem+json:
        schema:
          $ref: '#/components/schemas/ProblemDetails'
  '403':
    description: Forbidden
    content:
      application/problem+json:
        schema:
          $ref: '#/components/schemas/ProblemDetails'
  '404':
    description: Not Found
    content:
      application/problem+json:
        schema:
          $ref: '#/components/schemas/ProblemDetails'
  '405':
    description: Method Not Allowed
  '408':
    description: Request Timeout
    content:
      application/problem+json:

```

```
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'406':
  description: 406 Not Acceptable
'409':
  description: Conflict
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'410':
  description: Gone
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'411':
  description: Length Required
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'412':
  description: Precondition Failed
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'413':
  description: Content Too Large
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'414':
  description: URI Too Long
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'415':
  description: Unsupported Media Type
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'429':
  description: Too Many Requests
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'500':
  description: Internal Server Error
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'501':
  description: Not Implemented
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'502':
  description: Bad Gateway
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'503':
  description: Service Unavailable
  content:
    application/problem+json:
      schema:
        $ref: '#/components/schemas/ProblemDetails'
'504':
  description: Gateway Timeout
```

```
content:
  application/problem+json:
    schema:
      $ref: '#/components/schemas/ProblemDetails'
default:
  description: Generic Error
```

## Annex B (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-10	CT4#80	C4-175048				Initial Draft.	0.1.0
2017-10	CT4#80	C4-175400				Skeleton and scope	0.2.0
2017-12	CT4#81	C4-176442				After CT4#81	0.3.0
2018-01	CT4#82	C4-181395				After CT4#82	0.4.0
2018-03	CT4#83	C4-182440				After CT4#83	0.5.0
2018-04	CT4#84	C4-183521				After CT4#84	0.6.0
2018-05	CT4#85	C4-184635				After CT4#85	0.7.0
2018-06	CT#80	CP-181110				Presented for information and approval	1.0.0
2018-06	CT#80					Approved in CT#80	15.0.0
2018-09	CT#81	CP-182065	0001		F	ProblemDetails	15.1.0
2018-09	CT#81	CP-182065	0002		F	Structure of Amfld	15.1.0
2018-09	CT#81	CP-182065	0012		B	DNAI change notification type	15.1.0
2018-09	CT#81	CP-182065	0015		F	RatType	15.1.0
2018-09	CT#81	CP-182065	0017		B	Definition of DNAI	15.1.0
2018-09	CT#81	CP-182068	0008	1	B	Add support for 5G Trace	15.1.0
2018-09	CT#81	CP-182065	0010	1	F	OpenAPI Corrections	15.1.0
2018-09	CT#81	CP-182065	0013	1	B	Structure of ECGI and NCGI	15.1.0
2018-09	CT#81	CP-182065	0007	1	F	Averaging Window	15.1.0
2018-09	CT#81	CP-182065	0020	1	F	sd pattern	15.1.0
2018-09	CT#81	CP-182065	0021	1	F	Correction of the title of clauses 5.2.4.4 _LinksValueSchema and 5.2.4.5 _ SelfLink	15.1.0
2018-09	CT#81	CP-182065	0023		F	NAI format in 5G System	15.1.0
2018-09	CT#81	CP-182065	0031		F	GroupId Definition	15.1.0
2018-09	CT#81	CP-182065	0009	1	F	Removal of systematic references to the "format" keyword in data type definitions	15.1.0
2018-09	CT#81	CP-182065	0033		F	Naming Conventions	15.1.0
2018-09	CT#81	CP-182065	0027	1	F	5GMMCause and NGAP Cause	15.1.0
2018-09	CT#81	CP-182173	0006	3	F	BackUp AMF Info	15.1.0
2018-09	CT#81	CP-182065	0035		F	URI Scheme	15.1.0
2018-09	CT#81	CP-182065	0024	2	F	Cleanup of the specification	15.1.0
2018-09	CT#81	CP-182065	0025	1	F	Correction to Regular Expression Pattern of GPSI	15.1.0
2018-09	CT#81	CP-182065	0005	4	F	Common data types: NonDynamic5qi and Dynamic5qi	15.1.0
2018-09	CT#81	CP-182065	0028	1	F	Common data type used in both TS 29.505 and TS 29.519	15.1.0
2018-09	CT#81	CP-182065	0029	1	B	n6 Traffic Routing Information data type	15.1.0
2018-09	CT#81	CP-182065	0019	4	F	DefaultQoSInformation	15.1.0
2018-09	CT#81	CP-182065	0034	1	F	Update of N3gaLocation data type	15.1.0
2018-09	CT#81	CP-182065	0016	3	F	Mobility Restriction	15.1.0
2018-09	CT#81	CP-182042	0030	3	F	Adding "nullable" property to OpenAPI definitions of data types	15.1.0
2018-09	CT#81	CP-182174	0026	3	F	Presence Reporting Area	15.1.0
2018-09	CT#81	CP-182011	0032	4	F	Adding age of location, geographic information and other missing ones in the UserLocation type	15.1.0
2018-09	CT#81	CP-182183	0036	1	B	Common data type for data change notification	15.1.0
2018-09	CT#81	CP-182065	0037		F	API version number update	15.1.0
2018-12	CT#82	CP-183024	0040		F	Application ID	15.2.0
2018-12	CT#82	CP-183024	0049		F	Corrections to PDU Session Id, PDU Session Type and SupportedFeatures	15.2.0
2018-12	CT#82	CP-183024	0038	1	F	Area definition	15.2.0
2018-12	CT#82	CP-183024	0047	1	F	DNN	15.2.0
2018-12	CT#82	CP-183024	0044	1	F	Update of missing status code 429 in TS 29.571	15.2.0
2018-12	CT#82	CP-183024	0057	1	F	29571 CR cardinality	15.2.0
2018-12	CT#82	CP-183024	0045	2	F	The ARP in Default QoS	15.2.0
2018-12	CT#82	CP-183024	0058	1	F	Snsai pattern	15.2.0
2018-12	CT#82	CP-183024	0039	1	F	GroupId pattern	15.2.0
2018-12	CT#82	CP-183024	0059		F	Adding of HTTP status code "406 Not Acceptable"	15.2.0
2018-12	CT#82	CP-183024	0041	1	F	VarUeld definition	15.2.0
2018-12	CT#82	CP-183024	0061		F	ProblemDetails for 501	15.2.0
2018-12	CT#82	CP-183024	0063		F	Changeltem alignment	15.2.0
2018-12	CT#82	CP-183024	0046	2	F	Regular Expression Patterns	15.2.0
2018-12	CT#82	CP-183024	0048	3	F	Alignments with NGAP	15.2.0
2018-12	CT#82	CP-183168	0065	1	F	Secondary RAT usage data reporting	15.2.0
2018-12	CT#82	CP-183024	0060	1	F	Data types associated with Subscribed and Authorized Default QoS for Default QoS Flow	15.2.0
2018-12	CT#82	CP-183024	0042	3	F	Alignment of pattern for data types with "nullable" property	15.2.0
2018-12	CT#82	CP-183024	0062	1	F	NF Group Id	15.2.0
2018-12	CT#82	CP-183024	0053	2	F	data type for complex query expression	15.2.0
2018-12	CT#82	CP-183161	0064	2	F	NgRanIdentifier and PresenceInfo	15.2.0
2018-12	CT#82	CP-183024	0068		F	Addition of HTTP status code "412 Precondition Failed"	15.2.0
2018-12	CT#82	CP-183024	0051	3	F	Introduction of Barring of Roaming in 5GC	15.2.0
2018-12	CT#82	CP-183024	0066	1	F	Service Area Restriction	15.2.0

2018-12	CT#82	CP-183024	0067	1	F	Charging related types	15.2.0
2018-12	CT#82	CP-183024	0070		F	Correction of the reference for the SupportedFeatures Data Type	15.2.0
2018-12	CT#82	CP-183024	0072	1	F	Update open API version	15.2.0
2018-12	CT#82	CP-183024	0073		F	ExternalDoc update	15.2.0
2019-03	CT#83	CP-190029	0075	3	F	Corrections on subscribed Priority	15.3.0
2019-03	CT#83	CP-190029	0076	1	F	AmfRegionId and AmfSetId	15.3.0
2019-03	CT#83	CP-190029	0077	2	F	Supported features	15.3.0
2019-03	CT#83	CP-190029	0078	2	F	Corrections on n3iwf Id	15.3.0
2019-03	CT#83	CP-190029	0079	2	F	Corrections on the encoding of bit string	15.3.0
2019-03	CT#83	CP-190029	0081	2	F	Corrections on Type RouteToLocation	15.3.0
2019-03	CT#83	CP-190029	0082	1	F	ODB correction	15.3.0
2019-03	CT#83	CP-190029	0083		F	3GPP TS 29.571 API version update	15.3.0
2019-06	CT#84	CP-191041	0077	3	F	CR not implemented – Supported Features	15.4.0
2019-06	CT#84	CP-191041	0084	1	F	Service Area Restriction	15.4.0
2019-06	CT#84	CP-191041	0087	1	F	Changeltem Indicating Complete Resource Creation or Removal	15.4.0
2019-06	CT#84	CP-191041	0089	2	F	Storage of OpenAPI specification files	15.4.0
2019-06	CT#84	CP-191041	0090	1	F	Clarificaiton on Universal Matching Pattern Schema	15.4.0
2019-06	CT#84	CP-191041	0086	2	F	Correct the discription of 5qi in SubscribedDefaultQos	15.4.0
2019-06	CT#84	CP-191041	0097		F	AreaCode	15.4.0
2019-06	CT#84	CP-191041	0094	1	F	Required attributes in NotifyItem	15.4.0
2019-06	CT#84	CP-191041	0095	1	F	Regular Expression Pattern of DiameterIdentity	15.4.0
2019-06	CT#84	CP-191041	0096	1	F	Secondary RAT Usage reporting at PDU session level	15.4.0
2019-06	CT#84	CP-191041	0099	2	F	Copyright Note in YAML file	15.4.0
2019-06	CT#84	CP-191048	0100	1	B	3GPP TS 29.571 API version update	16.0.0
2019-06	CT#84	CP-191050	0093		B	Definition of MTC provider Information	16.0.0
2019-06	CT#84	CP-191050	0098	1	B	Extend value of RAT Type to add NBIOT	16.0.0
2019-06	CT#84	CP-191051	0088	3	B	Common Data Type for ATSSS Capability	16.0.0
2019-06	CT#84	CP-191052	0085	1	B	Addition of Event Reporting Information Parameters for network data analytics	16.0.0
2019-06	CT#84	CP-191055	0091	2	B	NF discovery factors	16.0.0
2019-09	CT#85	CP-192194	0102	3	B	NF Set and NF Service Set	16.1.0
2019-09	CT#85	CP-192133	0103		B	PlmnId	16.1.0
2019-09	CT#85	CP-192133	0104	1	B	Closed Access Group	16.1.0
2019-09	CT#85	CP-192028	0113	2	B	Network Identifier for SNPN	16.1.0
2019-09	CT#85	CP-192211	0105	2	B	Common Data Type for 5G SRVCC	16.1.0
2019-09	CT#85	CP-192115	0107	1	A	PRA ID encoding	16.1.0
2019-09	CT#85	CP-192123	0108	1	F	DNN Format correction	16.1.0
2019-09	CT#85	CP-192123	0111	2	B	PatchResult data type	16.1.0
2019-09	CT#85	CP-192120	0116	3	F	Extended PDU Session ID used in Core Network	16.1.0
2019-09	CT#85	CP-192195	0121	2	B	Small Data Rate Control Status	16.1.0
2019-09	CT#85	CP-192130	0122	2	B	Updates for 5WWC with HFC wireline access	16.1.0
2019-09	CT#85	CP-192120	0124		F	3GPP TS 29.571 API version update	16.1.0
2019-09	CT#85	CP-192210	0125		F	Correction and alignment of Sampling Ratio	16.1.0
2019-12	CT#86	CP-193032	0130		A	N3IWF ID encoding	16.2.0
2019-12	CT#86	CP-193032	0138		A	Correction to GNBld	16.2.0
2019-12	CT#86	CP-193057	0126	1	B	Format of NF (Service) Set ID	16.2.0
2019-12	CT#86	CP-193046	0142	1	F	MAC Address as PEI format	16.2.0
2019-12	CT#86	CP-193050	0143	1	F	Alternative 1 for global uniqueness of universally managed NID - simple data types correction	16.2.0
2019-12	CT#86	CP-193046	0135	2	B	Definition of TNAID	16.2.0
2019-12	CT#86	CP-193063	0131	1	B	HAL-forms data type	16.2.0
2019-12	CT#86	CP-193057	0127	3	B	Delegated Discovery Parameters Conveyance in HTTP/2 headers	16.2.0
2019-12	CT#86	CP-193049	0149		B	LTE-M RAT Type	16.2.0
2019-12	CT#86	CP-193062	0148	1	B	Common Data Type for RACS	16.2.0
2019-12	CT#86	CP-193063	0161	1	B	DNN Network Identifier and Operator Identifier	16.2.0
2019-12	CT#86	CP-193036	0114	5	B	Increasing the maximum MDBV value	16.2.0
2019-12	CT#86	CP-193031	0160	1	A	Wildcard DNN	16.2.0
2019-12	CT#86	CP-193032	0163	1	A	Correction to charging identifiers	16.2.0
2019-12	CT#86	CP-193036	0156	2	F	TAI and CGI in UserLocation	16.2.0
2019-12	CT#86	CP-193046	0158	2	B	Definition of HFC node Id and User Location information for HFC	16.2.0
2019-12	CT#86	CP-193225	0159	3	B	Wireline Service Area Restrictions	16.2.0
2019-12	CT#86	CP-193049	0144	1	B	Defining new data type for the Rate Control	16.2.0

2019-12	CT#86	CP-193049	0153	1	B	Expected UE Behaviour parameters	16.2.0
2019-12	CT#86	CP-193036	0150	2	B	Adding support for NR and E-UTRA accessing through unlicensed bands	16.2.0
2019-12	CT#86	CP-193063	0152	3	B	PRA for LTE UE	16.2.0
2019-12	CT#86	CP-193046	0154	3	B	ACS information	16.2.0
2019-12	CT#86	CP-193046	0136	4	B	QoS for wireline access network	16.2.0
2019-12	CT#86	CP-193046	0165		B	IPv4AddrMask	16.2.0
2019-12	CT#86	CP-193063	0145	1	B	InvalidParam Data Type	16.2.0
2019-12	CT#86	CP-193044	0167		F	API version and External doc update	16.2.0
2020-03	CT#87E	CP-200032	0168	1	C	NID	16.3.0
2020-03	CT#87E	CP-200020	0170	1	F	Enumerations and "nullable" keyword	16.3.0
2020-03	CT#87E	CP-200032	0176	1	F	CAG-ID size	16.3.0
2020-03	CT#87E	CP-200035	0172	2	B	New RAT Type values for Non-3GPP accesses	16.3.0
2020-03	CT#87E	CP-200033	0180		B	External Group Identifier	16.3.0
2020-03	CT#87E	CP-200031	0182		B	Remove Unused MaPduCapability Data Type	16.3.0
2020-03	CT#87E	CP-200035	0185		B	HFC NODE ID	16.3.0
2020-03	CT#87E	CP-200133	0190	1	B	CS/PS location	16.3.0
2020-03	CT#87E	CP-200018	0192		B	LCS service authorization	16.3.0
2020-03	CT#87E	CP-200033	0175	2	F	Status type definition	16.3.0
2020-03	CT#87E	CP-200035	0194		B	SupiOrSuci	16.3.0
2020-03	CT#87E	CP-200020	0191	1	F	Pattern of Ipv4AddrMask	16.3.0
2020-03	CT#87E	CP-200267	0183	3	B	Common data types for V2X service	16.3.0
2020-03	CT#87E	CP-200035	0173	4	B	User Location for wireline and trusted non-3GPP accesses	16.3.0
2020-03	CT#87E	CP-200035	0174	3	B	PEI for 5G-RG/FN-RG and for UEs not supporting any 3GPP access technologies	16.3.0
2020-03	CT#87E	CP-200035	0189	1	B	SUPI definition for 5G-RG and FN-RG	16.3.0
2020-03	CT#87E	CP-200021	0188	1	B	Remove the common data type Software Version Number	16.3.0
2020-03	CT#87E	CP-200181	0179	4	B	Downlink data delivery status	16.3.0
2020-03	CT#87E	CP-200033	0181	2	B	MO Exception Data Counter	16.3.0
2020-03	CT#87E	CP-200052	0195		F	API version and External doc update	16.3.0
2020-06	CT#88E	CP-201030	0198		F	HTTP redirection for indirect communication	16.4.0
2020-06	CT#88E	CP-201066	0201	1	F	Clarification of NF Instance ID encoding	16.4.0
2020-06	CT#88E	CP-201067	0196	1	B	MDT Configuration data for 5G g	16.4.0
2020-06	CT#88E	CP-201047	0202	1	B	Authentication and Authorization status	16.4.0
2020-06	CT#88E	CP-201048	0203	1	F	User Location of TWAP ID or TNAP ID	16.4.0
2020-06	CT#88E	CP-201034	0199	3	F	Slice Differentiator Ranges and Wildcard	16.4.0
2020-06	CT#88E	CP-201048	0197	1	F	User Location for W-5GBAN	16.4.0
2020-06	CT#88E	CP-201066	0205	1	F	Correction on unsigned integer types	16.4.0
2020-06	CT#88E	CP-201045	0207	1	F	Nid shall be present in data types of Tai/Ncgi/GlobalRanNodeId in case of SNPN	16.4.0
2020-06	CT#88E	CP-201045	0206	2	F	Identify for AMF in SNPN	16.4.0
2020-06	CT#88E	CP-201032	0208	1	F	Revising the definition of LcsServiceAuth data type	16.4.0
2020-06	CT#88E	CP-201048	0209	1	F	Extend GlobalRanNodeId to Support W-AGF and TNGF	16.4.0
2020-06	CT#88E	CP-201034	0210	1	F	Nullvalue and "nullable" keyword	16.4.0
2020-06	CT#88E	CP-201034	0222	1	F	Editorial corrections	16.4.0
2020-06	CT#88E	CP-201034	0223	1	F	Correct the data type in Pc5QosFlowItem	16.4.0
2020-06	CT#88E	CP-201034	0212	1	F	NotifyItem	16.4.0
2020-06	CT#88E	CP-201044	0214	3	B	UPF Supports RTT Measurements without PMF	16.4.0
2020-06	CT#88E	CP-201045	0227		F	Clarifications to TAI / ECGI / NCGI for SNPNs	16.4.0
2020-06	CT#88E	CP-201046	0225	1	F	Aligning "MO Exception data" handling with stage 2 - Data types	16.4.0
2020-06	CT#88E	CP-201048	0218	1	F	Removal of RG-TMBR	16.4.0
2020-06	CT#88E	CP-201048	0219	1	F	Update the RAT type definition	16.4.0
2020-06	CT#88E	CP-201048	0217	1	F	Reference for RgWirelineCharacteristics	16.4.0
2020-06	CT#88E	CP-201066	0220		F	Storage of YAML files in ETSI Forge	16.4.0
2020-06	CT#88E	CP-201066	0221		F	Binary IE Encoding	16.4.0
2020-06	CT#88E	CP-201066	0226	1	F	Correcting wrong reference	16.4.0
2020-06	CT#88E	CP-201073	0228		F	API version and External doc update	16.4.0
2020-09	CT#89E	CP-202107	0236	1	F	Dynamic CN PDB	16.5.0
2020-09	CT#89E	CP-202100	0232	1	F	Error corrections	16.5.0
2020-09	CT#89E	CP-202100	0234	1	F	Additional PRA ID	16.5.0
2020-09	CT#89E	CP-202103	0233	1	F	N5GC Location	16.5.0
2020-09	CT#89E	CP-202506	0231	1	F	Ncgi typo correction	16.5.0

2020-09	CT#89E	CP-202109	0229	1	F	Adding missing Reference to SUPI definition	16.5.0
2020-09	CT#89E	CP-202096	0237		F	Rel-16 API version and External doc update	16.5.0
2020-12	CT#90E	CP-203035	0239		F	Removal of the reference to ETSI forge	16.6.0
2020-12	CT#90E	CP-203031	0240		F	Correction for implementation error 29.571	16.6.0
2020-12	CT#90E	CP-203031	0243		F	Incomplete references and wrong table header	16.6.0
2020-12	CT#90E	CP-203039	0245		F	Alignment with TR-456 / TR-470 (BBF technical specifications)	16.6.0
2020-12	CT#90E	CP-203048	0241	1	F	ssid typo in yaml	16.6.0
2020-12	CT#90E	CP-203031	0246	1	F	MDT LTE Measurements	16.6.0
2020-12	CT#90E	CP-203068	0247	2	F	MDT Parameters for NR	16.6.0
2020-12	CT#90E	CP-203036	0248		F	Rel-16 API version and External doc update	16.6.0
2020-12	CT#90E	CP-203061	0238	1	F	Clarification to IPv6Prefix type	17.0.0
2021-03	CT#91E	CP-210037	0255		A	Error handling when the SCP fails to obtain an access token	17.1.0
2021-03	CT#91E	CP-210047	0254		A	NF Set ID and NF Service Set ID Definition for SNPN	17.1.0
2021-03	CT#91E	CP-210058	0256	1	A	Corrections on MDT parameters	17.1.0
2021-03	CT#91E	CP-210034	0257	1	F	OpenAPI Reference and description field for map data types	17.1.0
2021-03	CT#91E	CP-210021	0257	1	F	ProblemDetails content in responses to PATCH requests	17.1.0
2021-03	CT#91E	CP-210021	0260		F	29.571 Rel-17 API version and External doc update	17.1.0
2021-06	CT#92E	CP-211027	0265		B	Non-3GPP TAI	17.2.0
2021-06	CT#92E	CP-211080	0267		A	TAI in EutraLocation	17.2.0
2021-06	CT#92E	CP-211036	0272	1	B	Support of Mute Reporting	17.2.0
2021-06	CT#92E	CP-211059	0273	1	A	RedirectResponse data type definition	17.2.0
2021-06	CT#92E	CP-211040	0258		B	Support for satellite access RAT types	17.2.0
2021-06	CT#92E	CP-211039	0268	2	B	Add ProseServiceAuth	17.2.0
2021-06	CT#92E	CP-211036	0271	2	B	Common Partitioning criteria added	17.2.0
2021-06	CT#92E	CP-211028	0262	1	F	Changeltem operation definition	17.2.0
2021-06	CT#92E	CP-211031	0269	1	B	CS Address Information	17.2.0
2021-06	CT#92E	CP-211102	0274	1	F	Remove double definition and cleanup of the OpenAPI part	17.2.0
2021-06	CT#92E	CP-211103	0278	1	F	Additions of description in OpenAPI	17.2.0
2021-06	CT#92E	CP-211060	0280		A	Essential Correction to GeraLocation, LAC/RAC/SAC and Cell ID data types	17.2.0
2021-06	CT#92E	CP-211028	0281		B	EmptyObject definition	17.2.0
2021-06	CT#92E	CP-211048	0283	1	B	Extention of userLocationInfo attribute to support GERAN/UTRAN access	17.2.0
2021-06	CT#92E	CP-211031	0284	1	B	New NSAC related data types	17.2.0
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2024-12	CT#106	CP-243061	0600	2	B	MPQUIC-IP and MPQUIC-E capabilities	19.1.0
2024-12	CT#106	CP-243045	0603	2	B	Add ImsEvent to the IMS common data	19.1.0
2024-12	CT#106	CP-243064	0608	1	B	Support of MoQ Transport protocol	19.1.0
2024-12	CT#106	CP-243059	0609		F	Correction on Plmn Data type	19.1.0
2024-12	CT#106	CP-243059	0610	1	F	Add description in data types OpenAPI definition	19.1.0
2024-12	CT#106	CP-243059	0611	1	B	Support of Network Slice Area Scope of MDT	19.1.0
2024-12	CT#106	CP-243069	0615		F	29.571 Rel-19 API version and External doc update	19.1.0
2025-03	CT#107	CP-250032	0618	1	D	Type name alignment	19.2.0
2025-03	CT#107	CP-250031	0620	1	A	Correction of MBS support for eRedCap UEs	19.2.0
2025-03	CT#107	CP-250047	0621	2	B	Add the ADC interworking related IMS DC exposure event	19.2.0
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2025-03	CT#107	CP-250046	0630	1	B	MBS broadcast support for NTN	19.2.0
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2025-09	CT#109	CP-252050	0666	1	F	Definition of transparent containers for IMS Exposure	19.4.0
2025-09	CT#109	CP-252052	0667	1	F	Update or Removal of CAG List	19.4.0
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2025-09	CT#109	CP-252050	0677	1	F	Reference update: RFC 9796	19.4.0
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2025-09	CT#108	CP-252176	0682		F	29.571 Rel-19 API version and External doc update	19.4.0

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# History

<b>Document history</b>		
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