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Contents

Foreword

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

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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 4122: "A Universally Unique IDentifier (UUID) URN Namespace".

[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".

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
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
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]	

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])$'
Ipv4AddrRm	string	This data type is defined in the same way as the "Ipv4Addr" data type, but with the OpenAPI "nullable: true" property.
Ipv4AddrMask	string	String identifying a IPv4 address mask formatted in the "dotted decimal" notation as defined in IETF RFC 1166 [4]. Pattern: '^(([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.){3}([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])(\/([0-9]|[1-2][0-9]|3[0-2]))$'
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: '^((:|(0?|([1-9a-f][0-9a-f]{0,3})):)((0?|([1-9a-f][0-9a-f]{0,3})):){0,6}(:|(0?|([1-9a-f][0-9a-f]{0,3})))$' and Pattern: '^((([^:]+:){7}([^:]+))\|((([^:]+:)*[^:]+)?::(([^:]+:)*[^:]+)?))$'

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})))(\/(([0-9])|([0-9]{2})|(1[0-1][0-9])|(12[0-8])))$' and Pattern: '^((([^:]+:){7}([^:]+))\|((([^:]+:)*[^:]+)?::(([^:]+:)*[^:]+)?))(\/.+)$'
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 (2^32)-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 (2^64)-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.
VarUeId	string	String represents the SUPI or GPSI. Pattern: "^(imsi-[0-9]{5,15}|nai-.+|msisdn-[0-9]{5,15}|extid-[^@]+@[^@]+|gci-.+|gli-.+|.+)$".
VarUeIdRm	string	This data type is defined in the same way as the "VarUeId" 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"	This value indicates new attribute has been added to the resourceThe "ADD" operation performs one of the following functions, depending upon what the target location references: -If the target location specifies an array index, a new value is inserted into the array at the specified index. -If the target location specifies an object member that does not already exist, a new member is added to the object. -If the target location specifies an object member that does exist, that member's value is replaced. The operation object shall contain a "value" member whose content specifies the value to be added. For example: { "op": "ADD", "path": "/a/b/c", "value": ["foo", "bar"] } When the operation is applied, the target location shall reference one of: -The root of the target document - whereupon the specified value becomes the entire content of the target document. -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. -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. 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. 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: { "a": { "foo": 1 } } is not an error, because "a" exists, and "b" will be added to its value. It is an error in this document: { "q": { "bar": 2 } } because "a" does not exist.

"MOVE"	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. 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. The "from" location shall exist for the operation to be successful. For example: { "op": "MOVE", "from": "/a/b/c", "path": "/a/b/d" } 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. 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.
"REMOVE"	This value indicates existing attribute has been deleted from the resource. The "REMOVE" operation removes the value at the target location. The target location shall exist for the operation to be successful. For example: { "op": "REMOVE", "path": "/a/b/c" } If removing an element from an array, any elements above the specified index are shifted one position to the left.
"REPLACE"	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. The target location shall exist for the operation to be successful. For example: { "op": "REPLACE", "path": "/a/b/c", "value": 42 } 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.

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").	

5.2.4 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.
nrfId	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	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. 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"
reason	string	O	0..1	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]".

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 ChangeItem

Table 5.2.4.8-1: Definition of type ChangeItem

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 "ChangeItem" 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(ChangeItem)	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 an 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 an 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 match 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 5.2.4.29-1: 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".				

5.3 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] 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"). 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: '^[*]$'
WildcardDnnRm	string	This data type is defined in the same way as the "WildcardDnn" data type, but with the OpenAPI "nullable: true" property.
Gpsi	string	String identifying a Gpsi shall contain either an External Id or an MSISDN. It shall be formatted as follows: -External Identifier: "extid-<extid>, where <extid> shall be formatted according to clause 19.7.2 of 3GPP TS 23.003 [7] that describes an External Identifier. -MSISDN: "msisdn-<msisdn>, where <msisdn> shall be formatted according to clause 3.3 of 3GPP TS 23.003 [7] that describes an MSISDN. Pattern: '^(msisdn-[0-9]{5,15}|extid-.+@.+|.+)$'
GpsiRm	string	This data type is defined in the same way as the "Gpsi" data type, but with the OpenAPI "nullable: true" property.
GroupId	string	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 [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}$'.
GroupIdRm	string	This data type is defined in the same way as the "GroupId" data type, but with the OpenAPI "nullable: true" property.
ExternalGroupId	string	String identifying External Group Identifier that identifies a group made up of one or more subscriptions associated to a group of IMSIs, as specified in clause 19.7.3 of 3GPP TS 23.003 [7]. Pattern: "^extgroupid-[^@]+@[^@]+$"
ExternalGroupIdRm	string	This data type is defined in the same way as the "ExternalGroupId" data type, but with the OpenAPI "nullable: true" property.

Pei	string	String representing a Permanent Equipment Identifier that may contain: - an IMEI or IMEISV, as specified in clause 6.2 of 3GPP TS 23.003 [7]; - 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]. - 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]. Pattern: '^(imei-[0-9]{15}|imeisv-[0-9]{16}|mac((-[0-9a-fA-F]{2}){6})(-untrusted)?|eui((-[0-9a-fA-F]{2}){8})|.+)$'. See NOTE 1. Examples: imei-012345678901234 imeisv-0123456789012345 mac-00-00-5E-00-53-00 mac-00-00-5E-00-53-00-untrusted eui-AC-DE-48-23-45-67-01-9F
PeiRm	string	This data type is defined in the same way as the "Pei" data type, but with the OpenAPI "nullable: true" property.
Supi	string	String identifying a Supi that shall contain either an IMSI, a network specific identifier, a Global Cable Identifier (GCI) or a Global Line Identifier (GLI) as specified in clause 2.2A of 3GPP TS 23.003 [7]. It shall be formatted as follows: - for an IMSI "imsi-<imsi>", where <imsi> shall be formatted according to clause 2.2 of 3GPP TS 23.003 [7] that describes an IMSI. - for a network specific identifier "nai-<nai>, where <nai> shall be formatted according to clause 28.7.2 of 3GPP TS 23.003 [7] that describes an NAI. - for a GCI: "gci-<gci>", where <gci> shall be formatted according to clause 28.15.2 of 3GPP TS 23.003 [7]. - for a GLI: "gli-<gli>", where <gli> shall be formatted according to clause 28.16.2 of 3GPP TS 23.003 [7]. To enable that the value is used as part of an URI, the string shall only contain characters allowed according to the "lower-with-hyphen" naming convention defined in 3GPP TS 29.501 [2]. Pattern: '^(imsi-[0-9]{5,15}|nai-.+| gci-.+|gli-.+|.+)$' (NOTE 1).
SupiRm	string	This data type is defined in the same way as the "Supi" data type, but with the OpenAPI "nullable: true" property.
NfInstanceId	string	String uniquely identifying a NF instance. The format of the NF Instance ID shall be a Universally Unique Identifier (UUID) version 4, as described in IETF RFC 4122 [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. Example: "4ace9d34-2c69-4f99-92d5-a73a3fe8e23b" (NOTE 3)

AmfId	string	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 [7]. It is encoded as a string of 6 hexadecimal characters (i.e., 24 bits). Pattern: '^[A-Fa-f0-9]{6}$'
AmfRegionId	string	String identifying the AMF Region ID (8 bits), as specified in clause 2.10.1 of 3GPP TS 23.003 [7]. It is encoded as a string of 2 hexadecimal characters (i.e. 8 bits). Pattern: '^[A-Fa-f0-9]{2}$'
AmfSetId	string	String identifying 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: '^[0-3][A-Fa-f0-9]{2}$'
RfspIndex	integer	Unsigned integer representing the "Subscriber Profile ID for RAT/Frequency Priority" as specified in 3GPP TS 36.413 [16]. Minimum = 1. Maximum = 256.
RfspIndexRm	integer	This data type is defined in the same way as the "RfspIndex" data type, but with the OpenAPI "nullable: true" property.
NfGroupId	string	Identifier of a group of NFs
MtcProviderInformation	string	String uniquely identifying MTC provider information.
CagId	string	String containing a Closed Access Group Identifier. Pattern: "^[A-Fa-f0-9]{8}$"
SupiOrSuci	string	String identifying a SUPI or a SUCI. 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]+)|.+)$"
Imsi	string	String identifyting an IMSI Pattern: ^[0-9]{5,15}$
ApplicationlayerId	string	String identifying 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 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}$'
NidRm	string	This data type is defined in the same way as the "Nid" data type, but with the OpenAPI "nullable: true" property.
NfSetId	string	NF Set Identifier (see clause 28.12 of 3GPP TS 23.003 [7]), formatted as the following string: " set<Set ID>.<nftype>set.5gc.mnc<MNC>.mcc<MCC>", or "set<SetID>.<NFType>set.5gc.nid<NID>.mnc<MNC>.mcc<MCC>" with <MCC> encoded as defined in clause 5.4.2 ("Mcc" data type definition) <MNC> encoding the Mobile Network Code part of the PLMN, comprising 3 digits. If there are only 2 significant digits in the MNC, one "0" digit shall be inserted at the left side to fill the 3 digits coding of MNC. Pattern: '^[0-9]{3}$ <NFType> encoded as a value defined in Table 6.1.6.3.3-1 of 3GPP TS 29.510 [29] 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. Pattern: '^([A-Za-z0-9\-]*[A-Za-z0-9])$' Examples: "setxyz.smfset.5gc.mnc012.mcc345" "set12.pcfset.5gc.mnc012.mcc345" 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.

NfServiceSetId	string	NF Service Set Identifier (see clause 28.13 of 3GPP TS 23.003 [7]) 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}$' <NID> encoded as defined in clause 5.4.2 ("Nid" data type definition) <NFInstanceId> encoded as defined in clause 5.3.2 <ServiceName> encoded as defined in 3GPP TS 29.510 [29] <Set ID> encoded as a string of characters consisting of alphabetic characters (A-Z and a-z), digits (0-9) and/or the hyphen (-) and that shall end with either an alphabetic character or a digit. Pattern: '^([A-Za-z0-9\-]*[A-Za-z0-9])$ Examples: "setxyz.snnsmf-pdusession.nfi54804518-4191-46b3-955c-ac631f953ed8.5gc.mnc012.mcc345" "set2.snnpcf-smpolicycontrol.nfi54804518-4191-46b3-955c-ac631f953ed8.5gc.mnc012.mcc345" 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.
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	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]. Pattern: '^[0-9]{8}$'
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.

ENbId	string	This represents the identifier of the eNB ID as specified in clause 9.2.1.37 of 3GPP TS 36.413 [16]. The string shall be formatted with following pattern: 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. Examples: "SMacroeNB-34B89" indicates a Short Macro eNB ID with value 0x34B89.
Gli	Bytes	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]. 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].
Gci	string	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]. 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].
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	Relay Service Code to identify a connectivity service provided by the UE-to-Network relay or the UE-to-UE relay. Integer type as defined in OpenAPI Specification [3], with value range from 0 to 16777215 (decimal). Minimum = 0. Maximum = 16777215.
5GPrukId	string	Prose Remote User Key ID over Control Plane 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]. The CP-PRUK ID is a string in NAI format as specified in clause 28.7.11 of 3GPP TS 23.003 [7]. 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	integer	Containing a Network Slice AS Group ID, see 3GPP TS 38.413 [11]. Values between 0 and 255 are allowed for this data type in this release.
NsagIdRm	integer	This data type is defined in the same way as the "NsagId" data type, but with the OpenAPI "nullable: true" property.

GeoSatelliteId	string	Unique identifier of a GEO satellite. See e.g. clause 5.43.2 in 3GPP TS 23.501 [2].
OffloadIdentifier	string	Offload identifier uniquely identifying a VPLMN offloading policy information instance of the HPLMN. 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. 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}' The unique identifier shall match the following pattern: '[A-Fa-f0-9]{8}' It may further contain the version number (between 0 and 99) of the VPLMN offloading policy instance in the HPLMN. A VPLMN Specific 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}' Pattern: '^[0-9]{3}-[0-9]{2,3}-[A-Fa-f0-9]{8}(-v[0-9]{1,2}){0,1}$' Examples (with and without a version number): "262-01-00A17C01-v3" "302-720-00A17C01"

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.

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.

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 (NOTE 5)
"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)

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: CoreNetworkType

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: DlDataDeliveryStatus

Table 5.4.3.29-1: Enumeration DddStatus

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: DlDataDeliveryStatusRm

This enumeration is defined in the same way as the "DlDataDeliveryStatus" 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: SnssaiStatus

Table 5.4.3.43-1: Enumeration SnssaiStatus

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.

5.4.4 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: Snssai

Table 5.4.4.2-1: Definition of type Snssai

Attribute name	Data type	P	Cardinality	Description
sst	Uinteger	M	1	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 [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 Snssai 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.
globalNgenbId	GlobalRanNodeId	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.
globalENbId	GlobalRanNodeId	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 "globalNgenbId" attribute or the "globalENbId" 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.
globalGnbId	GlobalRanNodeId	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.
ntnTaiInfo	NtnTaiInfo	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.
n3IwfId	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.
ueIpv4Addr	Ipv4Addr	C	0..1	UE/N5CW device local IPv4 address (used to reach the N3IWF, TNGF or TWIF, or ePDG). The ueIpv4Addr or the ueIpv6Addr shall be present if the UE is accessing the 5GC via a trusted or untrusted non-3GPP access and the information is available.
ueIpv6Addr	Ipv6Addr	C	0..1	UE/N5CW device local IPv6 address (used to reach the N3IWF, TNGF or TWIF, or ePDG). The ueIpv4Addr or the ueIpv6Addr 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/N5CW 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.
routeProfId	string	C	0..1	Identifies the routing profile Id.
NOTE: At least one of the "routeInfo" attribute and the "routeProfId" 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	Ipv4address 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
praId	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"
additionalPraId	string	C	0..1	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	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 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.				

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, gNbIdm, 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, gNbIdm, 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	This represents the identifier of the gNB. The string shall be formatted with following pattern: '^[A-Fa-f0-9]{6,8}$' 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. 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

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	C	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	C	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	C	0..1	Indicates the support of Access Traffic Steering, Switching and Splitting procedures using the MPQUIC steering functionality (see clauses 4.2.10, 5.32 of 3GPP TS 23.501 [8]). true: Supported false (default): Not Supported
rttWithoutPmf	boolean	C	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.

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
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 APN (all PDN connections of the UE to this APN see clause 4.7.7.3 in 3GPP TS 23.401 [33]).
remainPacketsDl	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.
remainExReportsUl	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]).
remainExReportsDl	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)
acsIpv4Addr	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)
acsIpv6Addr	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, acsIpv4Addr, acsIpv6Addr 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: UtraLocation

Table 5.4.4.52-1: Definition of type UtraLocation

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: ServiceAreaId

Table 5.4.4.55-1: Definition of type ServiceAreaId

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: LocationAreaId

Table 5.4.4.56-1: Definition of type LocationAreaId

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: RoutingAreaId

Table 5.4.4.57-1: Definition of type RoutingAreaId

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.

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	This attribute may be present in the following cases: - to configure the monitoring threshold for the reporting of the number of registered UEs for a network slice identified by an S-NSSAI; - to report the network slice status for the current number of registered UEs. 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. 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. 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.
numericValNumPduSess	integer	C	0..1	This attribute may be present in the following cases: - to configure the monitoring threshold for the reporting of the number established PDU session for a network slice identified by an S-NSSAI; - to report the network slide status for the number of established PDU sessions. 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. 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. 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.

percValueNumUes	integer	C	0..1	This attribute may be present in the following cases: - to configure the monitoring threshold for the reporting of the number of registered UEs for a network slice identified by an S-NSSAI; - to report the network slice status for the number of registered UEs . 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. 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. Minimum = 0. Maximum = 100.
percValueNumPduSess	integer	C	0..1	This IE may be present in the following cases: - to configure the monitoring threshold for the reporting of the number of established PDU sessions for a network slice identified by an S-NSSAI; - to report the network slice status for the number of established PDU sessions. 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. 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. Minimum = 0. Maximum = 100.
uesWithPduSessionInd	boolean	C	0..1	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. When present, it shall be set as follows: - True: the numericValNumUes and percValueNumUes report the number of UEs with at least one PDU session/PDN connection. - False (default): the numericValNumUes and percValueNumUes report the current number of registered UEs.

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.
reachedNumPduSess	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, ipv6adresses 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 if 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(GeographicArea)	O	1..N	Identifies a list of geographic area specified by different shapes.
civicAddressList	array(CivicAddress)	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: PartiallyAllowedSnssai

Table 5.4.4.86-1: Definition of type PartiallyAllowedSnssai

Attribute name	Data type	P	Cardinality	Description
snssai	Snssai	M	1	This IE shall indicate the S-NSSAI that is partially allowed in the Registration Area.
allowedTaiList	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: RangingSlPosAuth

Table 5.4.4.88-1: Definition of type RangingSlPosAuth

Attribute name	Data type	P	Cardinality	Description
rgSlPosPc5Auth	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.
rgSlPosLocAuth	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.
rgSlPosClientAuth	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.
rgSlPosServerAuth	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
deregInactTimer	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) (NOTE)
sessInactTimer	DurationSec	C	0..1	Identifies the slice PDU Session inactivity timer for the Network Slice identified by the sNssai IE (see 3GPP TS 23.501 [8], clause 5.15.15.3) (NOTE)
NOTE: At least deregInactTimer 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: NtnTaiInfo

Table 5.4.4.94-1: Definition of type NtnTaiInfo

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 TAIs 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: VplmnDlAmbr

Table 5.4.4.96-1: VplmnDlAmbr

Attribute name	Data type	P	Cardinality	Description
vplmnId	PlmnId	M	1	V-PLMN ID.
sessionDlAmbr	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.

5.4.5 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: SnssaiReplaceInfo

Table 5.4.5.2-1: Definition of type SnssaiReplaceInfo

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: - the alternative VPLMN S-NSSAI for replacement of the impacted VPLMN S-NSSAI, when the snssai IE contains a VPLMN S-NSSAI; or - the alternative HPLMN S-NSSAI for replacement of the impacted HPLMN S-NSSAI, when the snssai IE contains an HPLMN S-NSSAI.
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: '^\d+(\.\d+)? (bps|Kbps|Mbps|Gbps|Tbps)$' (NOTE) Examples: "125 Mbps", "0.125 Gbps", "125000 Kbps"
BitRateRm	string	This data type is defined in the same way as the "BitRate" data type, but with the OpenAPI "nullable: true" property.
PacketRate	string	String representing a packet rate, i.e. packets per second, that shall be formatted as follows: Pattern: '^\d+(\.\d+)? (pps|kpps|Mpps|Gpps|Tpps)$' (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: '^\d+(\.\d+)? (B|kB|MB|GB|TB)$' (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 "*scalar* x 10-k" where the scalar and the *exponent k are each encoded as one decimal digit*. Pattern: '^([0-9]E-[0-9])$' Examples: Packer Error Rate $4x10^{-6}$ 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 10^3 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])

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])

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.

5.5.4 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.	
cnPacketDelayBudgetDl	ExtPacketDelBudget	O	0..1	Defines the Core Network Packet Delay Budget for downlink. See clause 5.5.2.	
cnPacketDelayBudgetUl	ExtPacketDelBudget	O	0..1	Defines the Core Network Packet Delay Budget for uplink. See clause 5.5.2.	

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.

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.

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.

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.	
cnPacketDelayBudgetDl	ExtPacketDelBudget	O	0..1	Defines the Core Network Packet Delay Budget for downlink. See clause 5.5.2.	
cnPacketDelayBudgetUl	ExtPacketDelBudget	O	0..1	Defines the Core Network Packet Delay Budget for uplink. See clause 5.5.2.	

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.

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.

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.				

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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 and/or End of Data Burst marking. When present, this IE shall contain information on the RTP header extension that can be used for PDU Set identification and/or End of Data Burst marking. (NOTE 1)
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 and/or End of Data Burst marking. (NOTE 1) (NOTE 2)

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 parseall 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]).
NOTE 2: In this release of the specification, the rtpPayloadInfoList contains only one RtpPayloadInfo element.
NOTE 3: Vendor/operator specific attributes may be supported as defined in clause 6.6.3 of 3GPP TS 29.500 [25].

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 identication;
- 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]}]}

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" and "rtpHeaderExtInf" with the removable data types "MediaTransportProtoRm" and RtpHeaderExtInfoRm" respectively; and

- the removalble 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 and/or End of Data Burst marking.
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 and/or End of Data Burst marking.

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	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 and/or End of Data Burst marking. 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	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 The absence of this IE means that this information is not known.
pduSetSizeActive	boolean	O	0..1	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 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].				

5.5.4.14A 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 removalble 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	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	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
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. (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 removalble 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. (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.				

5.6 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 "*PhysCellId*" 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 "*ARFCN-ValueNR*" 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_TRIGGED"	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.DelayDlPsaUpfUeMean.SNSSAI.QFI.
"GTP_DELAYULPSAUPFUEMEANEXCD1_SNSSAI_QFI"	GTP.DelayUlPsaUpfUeMeanExcD1.SNSSAI.QFI.
"GTP_DELAYDLPSAUPFUEMEANINCD1_SNSSAI_QFI"	GTP.DelayDlPsaUpfUeMeanIncD1.SNSSAI.QFI.
"GTP_DELAYULPSAUPFNGRANMEAN_SNSSAI_QFI"	GTP.DelayUlPsaUpfNgranMean.SNSSAI.QFI.
"GTP_DELAYDLPSAUPFNGRANMEAN_SNSSAI_QFI"	GTP.DelayDlPsaUpfNgranMean.SNSSAI.QFI.

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 (see 3GPP TS 32.422 [19]).

interfaceList	string	O	0..1	List of Interfaces (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]. If this attribute is not present, all the interfaces applicable to the list of NE types indicated in the neTypeList attribute should be traced. Pattern: '^[A-Fa-f0-9]+$'
jobType	JobType	C	0..1	This IE shall be present if it is available. When present, the IE shall be set to the value "TRACE_ONLY".

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 o the sensor measurements to be collected for UE 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	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. 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.
measurementPeriodLte	MeasurementPeriodLteMdt	C	0..1	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. 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.
mdtAllowedPlmnIdList	array(PlmnId)	O	1..N	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. Maximum of 16 PLMNs can be contained.
mbsfnAreaList	array(MbsfnArea)	O	1..N	When present, this IE shall contain MBSFN Area(s) for MBSFN measurement logging. Maximum of 8 MBSFN area(s) can be contained. This parameter is applicable only if the job type is Logged MBSFN MDT and for eUTRAN only.
interFreqTargetList	array(InterFreqTargetInfo)	O	1..8	When present, this IE shall indicate Inter Frequency Target(s) for which the UE is requested to perform measurement logging.
mnOnlyInd	boolean	O	0..1	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. This IE shall be set as follows: - true: MDT Configuration is for master node only - false (default): MDT Configuration is for both master node and secondary node.

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
mbsfnAreaId	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 mbsfnAreaId and carrierFrequency values are present, a specific MBSFN area is indicated. If carrierFrequency is present, but mbsfnAreaId is absent, all MBSFN areas on that carrier frequency are indicated. If both mbsfnAreaId 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
dlCarrierFreq	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(Plmn)	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.

5.7 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: '^(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})$'
		
		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.
MbsFsaId	string	MBS Frequency Selection Area ID, for a broadcast MBS session The value of the MbsFsaId 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}$'

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. 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 FFFFFF. 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).
taiList	array(Tai)	C	1..N	List of tracking area Ids (NOTE).
NOTE: 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.				

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

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
mbsFsaIdList	array(MbsFsaId)	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 UEs.

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).
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.
NOTE 3: These attributes are sent on different interfaces. Accordingly, they are mutually exclusive.

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.
nfcInstanceId	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	MbsSessionEventType	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	MbsSessionEventType	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	BroadcastDeliveryStatus	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(GeographicArea)	C	1..N	Identifies a list of geographic area specified by different shapes.
civicAddressList	array(CivicAddress)	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 [22], 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(TunnelAddress)	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.	
maxReqMbsBwDl	BitRate	O	0..1	Contains the Maximum requested bandwidth.	
minReqMbsBwDl	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 removalble 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: 40000000

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

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.	

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.	

5.11.4 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: ReplaceHttpUrl

Table 5.11.4.3-1: Definition of type ReplaceHttpUrl

Attribute name	Data type	P	Cardinality	Description
replaceHttpUrl	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 replaceHttpUrl 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.
appDcInfo	AppDcInfo	O	0..1	Represents the application data channel is intened towards to a server or the remote UE. This attribute is deprecated; the attribute "appDcInfoList" should be used instead.
appDcInfoList	array(AppDcInfo)	O	1..N	This attribute provides information of the remote endpoint type of application data channels.

5.11.4.6 Type: AppDcInfo

Table 5.11.4.6-1: Definition of type AppDcInfo

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.	

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: '1.5.3'


  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 18.10.0
  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
```

```
        OpenAPI 'nullable: true' property.
        The mixed IPv4 IPv6 notation according to clause 5 of RFC5952 shall not be used.

    Ipv6Prefix:
      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})))(\/(([0-9])|([0-9]{2})|(1[0-1][0-9])|(12[0-8])))$'
        - pattern: '^((([^:]+:){7}([^:]+))|((([^:]+:)*[^:]+)?::(([^:]+:)*[^:]+)?))(\/.+)$'
      example: '2001:db8:abcd:12::0/64'
      description: >
        String identifying an IPv6 address prefix formatted according to clause 4 of RFC 5952.
        IPv6Prefix data type may contain an individual /128 IPv6 address.

    Ipv6PrefixRm:
      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})))(\/(([0-9])|([0-9]{2})|(1[0-1][0-9])|(12[0-8])))$'
        - pattern: '^((([^:]+:){7}([^:]+))|((([^:]+:)*[^:]+)?::(([^:]+:)*[^:]+)?))(\/.+)$'
      nullable: true
      description: >
        String identifying an IPv6 address prefix formatted according to clause 4 of RFC 5952 with
        the OpenAPI 'nullable: true' property. IPv6Prefix data type may contain an individual
        /128 IPv6 address.

    MacAddr48:
      type: string
      pattern: '^([0-9a-fA-F]{2})((-[0-9a-fA-F]{2}){5})$'
      description: >
        String identifying a MAC address formatted in the hexadecimal notation
        according to clause 1.1 and clause 2.1 of RFC 7042.

    MacAddr48Rm:
      type: string
      pattern: '^([0-9a-fA-F]{2})((-[0-9a-fA-F]{2}){5})$'
      nullable: true
      description: >
        "String identifying a MAC address formatted in the hexadecimal notation according to
        clause 1.1 and clause 2.1 of RFC 7042 with the OpenAPI 'nullable: true' property."

    SupportedFeatures:
      type: string
      pattern: '^[A-Fa-f0-9]*$'
      description: >
        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. 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:
      type: integer
      minimum: 0
      description: Unsigned Integer, i.e. only value 0 and integers above 0 are permissible.

    UintegerRm:
      type: integer
      minimum: 0
      description: >
        Unsigned Integer, i.e. only value 0 and integers above 0 are permissible with
        the OpenAPI 'nullable: true' property.
      nullable: true

    Uint16:
      type: integer
      minimum: 0
      maximum: 65535
      description: >
        Integer where the allowed values correspond to the value range of an
        unsigned 16-bit integer.

    Uint16Rm:
```

```
    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.

#
#  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

  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

#
# 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, as described in IETF RFC 4122.

    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 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)

    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 9.3.3.10
        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.

    5GMmCause:
      $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}(-v[0-9]{1,2}){0,1}$'

#
# 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 wether 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
    - 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
      -UNKNOW: 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
     -BIDIRECTIONA: Bi-directional

  ScheduledCommunicationTypeRm:
    anyOf:
      - $ref: '#/components/schemas/ScheduledCommunicationType'
      - $ref: '#/components/schemas/NullValue'
    description: >
      This enumeration is defined in the same way as the 'ScheduledCommunicationTypen'
      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


#
# 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 subsribed 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 Snssai 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: >
        Containes 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 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
    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 theSmall 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 Identifer 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'
      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'

  UtraLocation:
    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: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
        ipv6Addr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
        portNumber:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        macAddr:
          $ref: 'TS29571_CommonData.yaml#/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 clause5.6.2 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
        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'

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:
    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'
        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:
      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:
      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

#
# 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
        - 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
        - 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.

#
#
# 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'
        rtpPayloadInfoList:
          type: array
          items:
            $ref: '#/components/schemas/RtpPayloadInfo'
          minItems: 1

    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'
        rtpPayloadInfoList:
          type: array
          nullable: true
          items:
            $ref: '#/components/schemas/RtpPayloadInfo'
```

```
          minItems: 1


    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

    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

    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.


#
# 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_TRIGGED
      - 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 32.42] 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_DELAYULPSAUPFNGRANMEAN_SNSSAI_QFI
            - GTP_DELAYDLPSAUPFNGRANMEAN_SNSSAI_QFI
        - type: string
      description: >
        The enumeration MeasurementType defines Measurement Type in the
        5GC UE level measurements trace.



#
# 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
      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

  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'



# 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|([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})$'

    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}$'



#
# 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 eRedCap 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-Fa-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
      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:
          $ref: '#/components/schemas/Uint16'
        clockAccuracyIndex:
          type: string
          pattern: '^[A-Fa-f0-9]{2}$'
        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-Fa-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}$'


#
# 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
        - 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


    SecuritySetup:
      description: security setup of the DTLS connection
      anyOf:
      - type: string
        enum:
          - ACTIVE
          - PASSIVE
          - ACTPASS
      - 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-Fa-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
```

```
    ReplaceHttpUrl:
      description: replacement HTTP URL per stream
      type: object
      properties:
        replaceHttpUrl:
          $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 intened 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'

#
# 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 AmfId	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	Snssai 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	VarUeId 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	ChangeItem 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	ChangeItem 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 GNbId	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 TNAP ID	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
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2023-12	CT#102	CP-233056	0489	3	B	Extend nrLocation to include NR NTN TAI information	18.4.0
2023-12	CT#102	CP-233038	0490	1	F	Correction of attribute Ipv6AddressRanges	18.4.0
2023-12	CT#102	CP-233056	0491		B	Addition of MBS parameters for QMC	18.4.0
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2023-12	CT#102	CP-233056	0493		F	Addition of missing descriptions of data types	18.4.0
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2024-06	CT#104	CP-241028	0556		B	Corrections for MDT enhancements to support NPN	18.6.0
2024-06	CT#104	CP-241050	0557	1	F	Description of mbsMediaComps attribute	18.6.0
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2024-06	CT#104	CP-241044	0561		F	Update the MediaProxy value and update the DcEndpoint data type	18.6.0
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2024-06	CT#104	CP-241050	0563		F	Correct the NfServiceSetId description	18.6.0
2024-06	CT#104	CP-241052	0564		F	29.571 Rel-18 API version and External doc update	18.6.0
2024-09	CT#105	CP-242048	0568	4	F	Correct the data type of AppDcInfo	18.7.0
2024-09	CT#105	CP-242053	0569	1	F	PDU Session Id range for 2G/3G access	18.7.0
2024-09	CT#105	CP-242053	0572	1	F	Correction on 5GC UE level measurements	18.7.0
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2024-09	CT#105	CP-242048	0579		F	29.571 Rel-18 API version and External doc update	18.7.0
2024-12	CT#106	CP-242054	0588	1	F	Update on access restrictions for satellite access	18.8.0
2025-03	CT#107	CP-250031	0626	1	F	Correction of MBS support for eRedCap UEs	18.9.0

2025-03	CT#107	CP-250021	0619	1	F	Update on access restrictions for satellite access	18.9.0
2025-03	CT#107	CP-250228	0634		F	29.571 Rel-18 API version and External doc update	18.9.0
2025-06	CT#108	CP-251053	0637		F	Essential correction on the RTP Payload Type range for Protocol Description	18.10.0
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2025-06	CT#108	CP-251078	0661		F	29.571 Rel-18 API version and External doc update	18.10.0

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