

ETSI TS 129 571 V16.14.0 (2024-04)



**5G;  
5G System;  
Common Data Types for Service Based Interfaces;  
Stage 3  
(3GPP TS 29.571 version 16.14.0 Release 16)**



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Reference

RTS/TSGC-0429571vGE0

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Keywords

5G

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# Modal verbs terminology

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# Foreword

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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.

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- 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.

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- cannot** indicates that something is impossible

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- 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

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In addition:

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

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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.
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- 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 3.0.0 Specification", <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.
- [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 7807: "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".
- [47] IETF RFC 7542: "The Network Access Identifier"

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## 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                           |
| EUI   | Extended Unique Identifier                               |
| GPSI  | Generic Public Subscription Identifier                   |
| GUAMI | Globally Unique AMF Identifier                           |
| HFC   | Hybrid Fiber Coax  |
| N5GC  | Non-5G Capable   |
| NSSAA | Network Slice- Specific Authentication and Authorization |
| PEI   | Permanent Equipment Identifier                           |
| SBI   | Service Based Interface                                  |
| SUPI  | Subscription Permanent Identifier                        |

---

## 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.

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## 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 |
|-------------|---------------------|----------|
| Fqdn        | 3GPP TS 29.510 [29] |          |
| NFType      | 3GPP TS 29.510 [29] |          |
| ServiceName | 3GPP TS 29.510 [29] |          |
| DataSetId   | 3GPP TS 29.510 [29] |          |
| PlmnSnsai   | 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**



|                   |         |  |
|-------------------|---------|--|
| Ipv6Prefix        | string  | String identifying an IPv6 address prefix formatted according to clause 4 of IETF RFC 5952 [5].<br>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]))\$'<br>and<br>Pattern: '^((([:+]{7}([[:+]] ([[:+]]*[:+])?::([[:+]]*[:+])?)))(V.+)\$'  |
| Ipv6PrefixRm      | string  | This data type is defined in the same way as the "Ipv6Prefix" data type, but with the OpenAPI "nullable: true" property.   |
| MacAddr48         | string  | String identifying a MAC address formatted in the hexadecimal notation according to clause 1.1 and clause 2.1 of IETF RFC 7042 [17].<br>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].<br>The string shall contain a bitmask indicating supported features in hexadecimal representation:<br>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.<br>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 $(2^{32})-1$ .<br>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 $(2^{64})-1$ .<br>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].  |
| UriRm             | string  | This data type is defined in the same way as the "Uri" data type, but with the OpenAPI "nullable: true" property.  |
| VarUeld           | string  | String represents the SUPI or GPSI.<br>Pattern: '^(\imsi-[0-9]{5,15} nai-+ msisdn-[0-9]{5,15}) extid-[^@]+@[^@]+ gci-+ gli-+ .+\$'   |
| VarUeldRm         | string  | This data type is defined in the same way as the "VarUeld" data type, but with the OpenAPI "nullable: true" property.  |
| TimeZone          | string  | String with format "<time-numoffset>" optionally appended by "<daylightSavingTime>", where:<br><br>- <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];<br><br>- <daylightSavingTime> shall represent the adjustment that has been made and shall be encoded as "+1" or "+2" for a +1 or +2 hours adjustment.<br><br>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].<br>Pattern: " <sup>^</sup> [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.  |
| 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].<br>Examples: "20:15:00", "20:15:00-08:00" (for 8 hours behind UTC).                             |

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]  |
| 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    | If a feature is not defined, it shall 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 value of "1", or "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 value of "80000000".

## 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 resource                           |
| "MOVE"            | This value indicates existing attribute has been moved to a different path in the resource. |
| "REMOVE"          | This value indicates existing attribute has been deleted from the resource.                 |
| "REPLACE"         | This value indicates existing attribute has been updated with new 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 |

## 5.2.4 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<br>This IE should be present and provide application-related error information, if available.   |
| invalidParams  | array(InvalidParam) | O | 1..N        | Description of invalid parameters, for a request rejected due to invalid parameters.  |
| supportedFeatures  | SupportedFeatures   | C | 0..1        | Features supported by the NF Service Producer.<br><br>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]).<br><br>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.<br>When present, it should contain the Access Token Error payload 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.<br>When present, it shall contain the Access Token Request that was sent by the SCP.   |
| nrfId  | string              | O | 0..1        | This IE may be present if an SCP request to get an access token was rejected by the NRF.<br>When present, it shall contain the Identity (i.e. FQDN) of the NRF that rejected the access token request.  |
| NOTE 1: See IETF RFC 7807 [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.<br>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.<br>It shall be present if the patch operation is "add", "replace" or "test".<br>The data type of this attribute shall be the same as the type of the resource on which the patch operation shall be performed. The null value shall be allowed. |               |

## 5.2.4.4 Type: LinksValueSchema

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

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

## 5.2.4.5 Type: SelfLink

Table 5.2.4.5-1: Definition of type SelfLink

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

## 5.2.4.6 Type: InvalidParam

Table 5.2.4.6-1: Definition of type InvalidParam

| Attribute name | Data type | P | Cardinality | Description  |
|----------------|-----------|---|-------------|--|
| param          | string    | M | 1           | <p>If the invalid parameter is an attribute in a JSON body, this IE shall contain the attribute's name and shall be encoded as a JSON Pointer.</p> <p>If the invalid parameter is an HTTP header, this IE shall be formatted as the concatenation of the string "header: " plus the name of such header.</p> <p>If the invalid parameter is a query parameter, this IE shall be formatted as the concatenation of the string "query: " plus the name of such query parameter.</p> <p>If the invalid parameter is a variable part in the path of a resource URI, this IE shall contain the name of the variable, including the symbols "{" and "}" used in OpenAPI specification as the notation to represent variable path segments.</p> |
| reason         | string    | O | 0..1        | A human-readable reason, e.g. "must be a positive integer".  |

## 5.2.4.7 Type: LinkRm

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

## 5.2.4.8 Type Changeltem

Table 5.2.4.8-1: Definition of type Changeltem

| Attribute name | Data type   | P | Cardinality | Description   | Applicability |
|----------------|---|---|-------------|---|---------------|
| op             | ChangeType  | M | 1           | This IE indicates the change type which happens to 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.<br>(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.<br>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"<br>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.<br>It shall be present if the "op" attribute is of value "ADD", "REPLACE".<br>The data type of this attribute shall be the same as the type of the resource on which the change has happened.<br>The null value shall be allowed. |               |
| NOTE:          | As described in IETF RFC 6901 [12], the value "" (empty JSON string) is the JSON Pointer expression to represent "the whole JSON document"; therefore, when the attribute "path" takes value "" and attribute "op" takes values "ADD" or "REMOVE", this shall be interpreted as the creation or deletion respectively of the resource to which this "Changeltem" refers to. |   |             |   |               |

## 5.2.4.9 Type NotifyItem

Table 5.2.4.9-1: Definition of type NotifyItem

| Attribute name | Data type  | P | Cardinality | Description   | Applicability |
|----------------|--|---|-------------|---|---------------|
| resourceId     | Uri  | M | 1           | This IE contains the URI of the resource which has been changed.  |               |
| changes        | array(Changeltem)  | M | 1..N        | This IE contains the changes which have been applied on the resource identified by the resourceId attribute.<br>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<br>a) a change item with op set to "REMOVE" and path pointing to the attribute to be removed, or<br>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.<br>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. |               |

## 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:<br>- true: required<br>- 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.<br>If the redirection is initiated by an SCP towards another SCP, this IE shall be present and set to "SCP_REDIRECTION".<br>If the redirection is initiated by an SEPP towards another SEPP, this IE shall be present and set to "SEPP_REDIRECTION". |
| 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 HTTP request is redirected (see clause 6.10.9 of 3GPP TS 29.500 [25]).   |

## 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.   |
| 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.<br>It shall contain the string "**".<br>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:<br>-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.<br>-MSISDN: "msisdn-<msisdn>", where <msisdn> shall be formatted according to clause 3.3 of 3GPP TS 23.003 [7] that describes an MSISDN.<br>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].<br><br>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].<br><br>Pattern: "^\textgroupid-[@]+@[^@]+\$"   |
| 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 | <p>String representing a Permanent Equipment Identifier that may contain:</p> <ul style="list-style-type: none"> <li>- an IMEI or IMEISV, as specified in clause 6.2 of 3GPP TS 23.003 [7];</li> <li>- a MAC address for a 5G-RG or FN-RG via wireline access, with an indication that this address cannot be trusted for regulatory purpose if this address cannot be used as an Equipment Identifier of the FN-RG, as specified in clause 4.7.7 of 3GPP TS 23.316 [30].</li> <li>- an IEEE Extended Unique Identifier (EUI-64), for UEs not supporting any 3GPP access technologies, as defined in IEEE "Guidelines for Use of Extended Unique Identifier (EUI), Organizationally Unique Identifier (OUI), and Company ID (CID)" [38].</li> </ul> <p>Pattern: <code>^(imei-[0-9]{15} imeisv-[0-9]{16} mac((-[0-9a-fA-F]{2}){6})(-untrusted)? eui((-[0-9a-fA-F]{2}){8}) .+)\$. See NOTE 1.</code></p> <p>Examples:<br/> imei-012345678901234<br/> imeisv-0123456789012345<br/> mac-00-00-5E-00-53-00<br/> mac-00-00-5E-00-53-00-untrusted<br/> eui-AC-DE-48-23-45-67-01-9F</p>  |
| PeiRm         | string | This data type is defined in the same way as the "Pei" data type, but with the OpenAPI "nullable: true" property.  |
| Supi          | string | <p>String 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].</p> <p>It shall be formatted as follows:</p> <ul style="list-style-type: none"> <li>- for an IMSI "imsi-&lt;imsi&gt;", where &lt;imsi&gt; shall be formatted according to clause 2.2 of 3GPP TS 23.003 [7] that describes an IMSI.</li> <li>- for a network specific identifier "nai-&lt;nai&gt;", where &lt;nai&gt; shall be formatted according to clause 28.7.2 of 3GPP TS 23.003 [7] that describes an NAI.</li> <li>- for a GCI: "gci-&lt;gci&gt;", where &lt;gci&gt; shall be formatted according to clause 28.15.2 of 3GPP TS 23.003 [7].</li> <li>- for a GLI: "gli-&lt;gli&gt;", where &lt;gli&gt; shall be formatted according to clause 28.16.2 of 3GPP TS 23.003 [7].</li> </ul> <p>To enable that the value is used as part of an URI, the string shall only contain characters allowed according to the "lower-with-hyphen" naming convention defined in 3GPP TS 29.501 [2].</p> <p>Pattern: <code>^(imsi-[0-9]{5,15} nai-.+ gci-.+ gli-.+ .+)\$. (NOTE 1).</code></p> |
| SupiRm        | string | This data type is defined in the same way as the "Supi" data type, but with the OpenAPI "nullable: true" property.   |
| NfInstancelid | string | 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]. (NOTE 3)  |
| Amfld         | string | <p>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].</p> <p>It is encoded as a string of 6 hexadecimal characters (i.e., 24 bits).</p> <p>Pattern: <code>^[A-Fa-f0-9]{6}\$</code></p>   |

|   |         |  |
|---|---------|--|
| 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]+).+)\$"                                  |
| 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

For Data Types related to Subscription, Identification and Numbering, no Enumerations data types are defined in this version of the specification.

### 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).   |
| 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].<br>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].<br>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.<br><br>Examples:<br>A legacy TAC 0x4305 shall be encoded as "4305".<br>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.<br><br>Pattern: '^[A-Fa-f0-9]{7}\$'<br><br>Example:<br>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.<br><br>Pattern: '^[A-Fa-f0-9]{9}\$'<br><br>Example:<br>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    | string   | 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.  |
| N3IwflD    | 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.<br>Pattern: '^([A-Fa-f0-9])+\$'<br><br>Example:<br>The N3IWF Id 0x5BD6 shall be encoded as "5BD6".  |
| WAgflD     | 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.<br>Pattern: '^([A-Fa-f0-9])+\$'<br><br>Example:<br>The W-AGF Id 0x5BD6 shall be encoded as "5BD6".   |
| TngflD     | 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.<br>Pattern: '^([A-Fa-f0-9])+\$'<br><br>Example:<br>The TNGF Id 0x5BD6 shall be encoded as "5BD6".   |
| NgeNbld    | string   | This represents the identifier of the ng-eNB ID as specified in clause 9.3.1.8 of 3GPP TS 38.413 [11].<br><br>The string shall be formatted with following pattern:<br>Pattern: '^([MacroNGeNB-[A-Fa-f0-9]{5})LMacroNGeNB-[A-Fa-f0-9]{6})SMacroNGeNB-[A-Fa-f0-9]{5})\$'<br><br>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.<br><br>Examples:<br>"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).<br>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:<br><br>" set<Set ID>.<NFType>set.5gc.mnc<MNC>.mcc<MCC>", or "set<SetID>.<NFType>set.5gc.nid<NID>.mnc<MNC>.mcc<MCC>"<br><br>with<br><MCC> encoded as defined in clause 5.4.2 ("Mcc" data type definition)<br><br><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}\$'<br><br><NID> encoded as defined in clause 5.4.2 ("Nid" data type definition)<br><br><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<br><br><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.<br>Pattern: '[A-Za-z0-9\-\-]*[A-Za-z0-9]\$'<br><br>Examples:<br>"setxyz.smfset.5gc.mnc012.mcc345"<br>"set12.pcfset.5gc.mnc012.mcc345" |

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

|   |        |   |
|---|--------|---|
| ENbld   | string | <p>This represents the identifier of the eNB ID as specified in clause 9.2.1.37 of 3GPP TS 36.413 [16].</p> <p>The string shall be formatted with following pattern:<br/>Pattern: '^(\MacroNB-[A-Fa-f0-9]{5})LMacroNB-[A-Fa-f0-9]{6}SMacroNB-[A-Fa-f0-9]{5}HomeNB-[A-Fa-f0-9]{7})\$'</p> <p>The value of the eNB ID shall be encoded in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The padding 0 shall be added to make multiple nibbles, so the most significant character representing the padding 0 if required together with the 4 most significant bits of the eNB ID shall appear first in the string, and the character representing the 4 least significant bit of the eNB ID (to form a nibble) shall appear last in the string.</p> <p>Examples:<br/>"SMacroNB-34B89" indicates a Short Macro eNB ID with value 0x34B89.</p> |
| Gli   | Bytes  | <p>Global Line Identifier uniquely identifying the line connecting the 5G-BRG or FN-BRG to the 5GS. See clause 28.16.3 of 3GPP TS 23.003 [7].</p> <p>This shall be encoded as a string with format "byte" as defined in OpenAPI Specification [3], i.e. base64-encoded characters, representing the GLI value (up to 150 bytes) encoded as specified in BBF WT-470 [37].</p>  |
| Gci   | string | <p>Global Cable Identifier uniquely identifying the connection between the 5G-CRG or FN-CRG to the 5GS. See clause 28.15.4 of 3GPP TS 23.003 [7].</p> <p>This shall be encoded as a string per clause 28.15.4 of 3GPP TS 23.003 [7], and compliant with the syntax specified in clause 2.2 of IETF RFC 7542 [47] for the username part of a NAI. The GCI value is specified in CableLabs WR-TR-5WWC-ARCH [32].</p>  |
| <p>NOTE: For a PDN connection established via MME, 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.</p> |        |   |

## 5.4.3 Enumerations

### 5.4.3.1 Enumeration: AccessType

**Table 5.4.3.1-1: Enumeration AccessType**

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

### 5.4.3.2 Enumeration: RatType

**Table 5.4.3.2-1: Enumeration RatType**

| Enumeration value  | Description   |
|--|---|
| "NR"   | New Radio   |
| "EUTRA"  | (WB) Evolved Universal Terrestrial Radio Access                     |
| "WLAN"   | Untrusted Wireless LAN (IEEE 802.11) access                         |
| "VIRTUAL"  | Virtual (see NOTE 1)  |
| "NB-IOT"   | 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                                       |
| 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. |   |

### 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: DIDataDeliveryStatus

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: DIDataDeliveryStatusRm

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

## 5.4.3.31 Void

## 5.4.3.32 Enumeration: AuthStatus

**Table 5.4.3.32-1: Enumeration AuthStatus**

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

## 5.4.3.33 Enumeration: LineType

**Table 5.4.3.33-1: Enumeration LineType**

| Enumeration value | Description |
|-------------------|-------------|
| "DSL"             | DSL line    |
| "PON"             | PON line    |

## 5.4.3.34 Enumeration: LineTypeRm

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

## 5.4.3.35 Enumeration: LineType

**Table 5.4.3.35-1: Enumeration LineType**

| Enumeration value | Description |
|-------------------|-------------|
| "DSL"             | DSL line    |
| "PON"             | PON line    |

## 5.4.3.36 Enumeration: LineTypeRm

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

## 5.4.3.37 Enumeration: TransportProtocol

**Table 5.4.3.37-1: Enumeration TransportProtocol**

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

## 5.4.4 Structured Data Types

### 5.4.4.1 Type: SubscribedDefaultQos

**Table 5.4.4.1-1: Definition of type SubscribedDefaultQos**

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

### 5.4.4.2 Type: Sns sai

**Table 5.4.4.2-1: Definition of type Sns sai**

| Attribute name | Data type | P | Cardinality | Description   |
|----------------|-----------|---|-------------|---|
| sst            | 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.<br><br>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.<br><br>Pattern: '[A-Fa-f0-9]{6}\$' |

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

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

Example 1: "255-19CDE0"

Example 2: "29"

## 5.4.4.3 Type: PlmnId

Table 5.4.4.3-1: Definition of type PlmnId

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

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

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

Example 1: "262-01"

Example 2: "302-720"

## 5.4.4.4 Type: Tai

Table 5.4.4.4-1: Definition of type Tai

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

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

## 5.4.4.5 Type: Ecgi

Table 5.4.4.5-1: Definition of type Ecgi

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

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

## 5.4.4.6 Type: Ncgi

Table 5.4.4.6-1: Definition of type Ncgi

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

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

## 5.4.4.7 Type: UserLocation

Table 5.4.4.7-1: Definition of type UserLocation

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

## 5.4.4.8 Type: EutraLocation

Table 5.4.4.8-1: Definition of type EutraLocation

| Attribute name           | Data type   | P | Cardinality | Description   |
|--------------------------|---|---|-------------|---|
| tai                      | Tai   | M | 1           | Tracking Area Identity.<br>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.<br>When present, it shall be set as follows:<br>- true: tai shall be ignored.<br>- 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.<br>When present, it shall be set as follows:<br>- true: ecgi shall be ignored.<br>- 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.<br>Any other value than "0" indicates that the location information is the last known one.<br>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.<br>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.<br>Allowed characters are 0-9 and A-F;  |
| geodeticInformation      | string  | O | 0..1        | Refers to Calling Geodetic Location.<br>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.<br>Allowed characters are 0-9 and A-F.  |
| globalNgenbld            | GlobalRanNodeBId  | O | 0..1        | It indicates the global identity of the ng-eNodeB in which the UE is currently located.<br>See 3GPP TS 38.413 [11] clause 9.3.1.8.  |
| globalENbld              | GlobalRanNodeBId  | O | 0..1        | It indicates the global identity of the eNodeB in which the UE is currently located.<br>See 3GPP TS 36.413 [16] clause 9.2.1.37.  |
| NOTE:                    | Either the "globalNgenbld" attribute or the "globalENbld" attribute shall be included in the "EutraLocation" data type. |   |             |   |

## 5.4.4.9 Type: NrLocation

Table 5.4.4.9-1: Definition of type NrLocation

| Attribute name           | Data type        | P | Cardinality | Description   |
|--------------------------|------------------|---|-------------|---|
| tai                      | Tai              | M | 1           | Tracking Area Identity  |
| ncgi                     | Ncgi             | M | 1           | NR Cell Identity  |
| ignoreNcgi               | boolean          | O | 0..1        | This flag when present shall indicate that the Ncgi shall be ignored.<br>When present, it shall be set as follows:<br>- true: ncgi shall be ignored.<br>- 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.<br>Any other value than "0" indicates that the location information is the last known one.<br>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.<br>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.<br>Allowed characters are 0-9 and A-F;  |
| geodeticInformation      | string           | O | 0..1        | Refers to Calling Geodetic Location.<br>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.<br>Allowed characters are 0-9 and A-F.  |
| globalGnbld              | GlobalRanNodeBId | O | 0..1        | It indicates the global identity of the gNodeB in which the UE is currently located.<br>See 3GPP TS 38.413 [11] clause 9.3.1.6.   |

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        | The unique non 3GPP TAI used in the PLMN. It shall be present over the 3GPP PLMN internal interfaces, but shall not be present over the N5 interface.  |
| n3lwfld        | string            | C | 0..1        | This IE shall contain the N3IWF identifier received over NGAP and shall be encoded as a string of hexadecimal characters. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the N3IWF ID shall appear first in the string, and the character representing the 4 least significant bit of the N3IWF ID shall appear last in the string.<br><br>Pattern: '[A-Fa-f0-9]+\$'<br><br>Example:<br>The N3IWF Id 0x5BD6 shall be encoded as "5BD6".<br><br>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. |
| uelpv4Addr     | Ipv4Addr          | C | 0..1        | UE/N5CW device local IPv4 address (used to reach the N3IWF, TNGF or TWIF).<br>The uelPv4Addr or the uelPv6Addr shall be present if the UE is accessing the 5GC via a trusted or untrusted non-3GPP access and the information is available.  |
| uelpv6Addr     | Ipv6Addr          | C | 0..1        | UE/N5CW device local IPv6 address (used to reach the N3IWF, TNGF or TWIF).<br>The uelPv4Addr or the uelPv6Addr shall be present if the UE is accessing the 5GC via a trusted or untrusted non-3GPP access and the information is available.  |
| portNumber     | UInteger          | C | 0..1        | UDP or TCP source port number. It shall be present if the UE is accessing the 5GC via a trusted or untrusted non-3GPP access and NAT is detected.  |
| protocol       | TransportProtocol | O | 0..1        | This IE may be present if portNumber is present.<br><br>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.<br><br>The absence of this IE indicates that the transport protocol used by the UE to access the core network via a trusted or untrusted non-3GPP access is not specified, i.e. could be UDP or TCP.   |
| tnapId         | TnapId            | C | 0..1        | This IE shall contain the TNAF Identifier, see clause 5.6.2 of 3GPP TS 23.501 [8].   |
| twapId         | TwapId            | C | 0..1        | This IE shall contain the TWAF Identifier, see clause 4.2.8.5.3 of 3GPP TS 23.501 [8].   |
| 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.   |
| 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.   |
| 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]  |

## 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.<br><br>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:<br><br>0 – radioNetwork<br>1 – transport<br>2 – nas<br>3 – protocol<br>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 related to the specific GUAMI(s) (see clause 5.21.2.3 of 3GPP TS 23.501 [8]). If no GUAMI is included in BackupAmfinfo, the AMF name of the backup AMF is related to all the GUAMI(s) supported by the AMF. |
| guamiList      | array(Guami) | C | 1..N        | If present, this IE shall contain the list of GUAMI(s) (supported by the AMF) for which the backupAmf IE applies.  |

## 5.4.4.14 Type: RefToBinaryData

Table 5.4.4.14-1: Definition of type RefToBinaryData

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

## 5.4.4.15 Type RouteToLocation

Table 5.4.4.15-1: Definition of type RouteToLocation

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

## 5.4.4.16 Type RouteInformation

Table 5.4.4.16-1: Definition of type RouteInformation

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

## 5.4.4.17 Type: Area

Table 5.4.4.17-1: Definition of type Area

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

## 5.4.4.18 Type: ServiceAreaRestriction

Table 5.4.4.18-1: Definition of type ServiceAreaRestriction

| Attribute name                 | Data type       | P | Cardinality    | Description  |
|--------------------------------|-----------------|---|----------------|--|
| restrictionType                | RestrictionType | C | 0..1           | string<br>"ALLOWED_AREAS" or<br>"NOT_ALLOWED_AREAS"<br>shall be present if and only if the areas attribute is present  |
| areas                          | array(Area)     | O | 0..N<br>(NOTE) | A list of Areas.<br>These areas are:<br>- allowed areas if RestrictionType is "ALLOWED_AREAS"<br>- 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".<br>This attribute shall be absent when attribute "restrictionType" takes the value "NOT_ALLOWED_AREAS". |
| maxNumOfTAsForNot AllowedAreas | UInteger        | C | 0..1           | Maximum number of allowed tracking areas for use when restrictionType indicates "NOT_ALLOWED_AREAS".<br>This attribute shall be absent when attribute "restrictionType" takes the value "ALLOWED_AREAS". |

NOTE: The empty array is used when service is allowed/restricted nowhere.

## 5.4.4.19 Type: PlmnIdRm

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

## 5.4.4.20 Type: TaiRm

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

## 5.4.4.21 Type: EcgiRm

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

## 5.4.4.22 Type: NcgiRm

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

## 5.4.4.23 Type: EutraLocationRm

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

## 5.4.4.24 Type: NrLocationRm

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

## 5.4.4.25 Type: UpSecurityRm

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

## 5.4.4.26 Type: RefToBinaryDataRm

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

## 5.4.4.27 Type: PresenceInfo

Table 5.4.4.27-1: Definition of type PresenceInfo

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

## 5.4.4.28 Type: GlobalRanNodeId

Table 5.4.4.28-1: Definition of type GlobalRanNodeId

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

## 5.4.4.29 Type: GNbId

Table 5.4.4.29-1: Definition of type GNbId

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

## 5.4.4.30 Type: PresenceInfoRm

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

## 5.4.4.31 Void

## 5.4.4.32 Type: AtsssCapability

Table 5.4.4.32-1: Definition of type AtsssCapability

| Attribute name | Data type | P | Cardinality | Description  |
|----------------|-----------|---|-------------|--|
| atsssLL        | boolean   | C | 0..1        | Indicates the ATSSS-LL capability to support procedures related to Access Traffic Steering, Switching, Splitting (see clauses 4.2.10, 5.32 of 3GPP TS 23.501 [8]).<br>true: Supported<br>false (default): Not Supported  |
| mptcp          | boolean   | C | 0..1        | Indicates the MPTCP capability to support procedures related to Access Traffic Steering, Switching, Splitting (see clauses 4.2.10, 5.32 of 3GPP TS 23.501 [8]).<br>true: Supported<br>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.<br><br>true: Supported<br>false (default): Not Supported. |

## 5.4.4.33 Type: PlmnlDnId

Table 5.4.4.33-1: Definition of type PlmnlDnId

| 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 PlmnlDnId identifies an SNPN; otherwise shall be absent. |

## 5.4.4.34 Type: PlmnlDnIdRm

This data type is defined in the same way as the "PlmnlDnId" 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.<br>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.<br>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.<br>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.<br>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.<br>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 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 for 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                         |               |
| NOTE: One and only one of the "globLineIds", "hfcNIds", "areaCodeB" and "areaCodeC" 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<br>"ALLOWED_AREAS" or<br>"NOT_ALLOWED_AREAS"<br>(NOTE 1)   |
| areas   | array(WirelineArea) | C | 0..N        | A list of Areas.<br>These areas are:<br>- allowed areas if RestrictionType is "ALLOWED_AREAS"<br>- not allowed areas if RestrictionType is "NOT_ALLOWED_AREAS"<br>(NOTE 1) (NOTE 2) |
| NOTE 1: The "restrictionType" attribute and the "areas" attribute shall be either both present or absent. |                     |   |             |   |
| NOTE 2: The empty array is used when service is allowed/restricted nowhere.                               |                     |   |             |   |

## 5.4.4.40 Type: ApnRateStatus

Table 5.4.4.40-1: Definition of type ApnRateStatus

| Attribute name    | Data type | P | Cardinality | Description  |
|-------------------|-----------|---|-------------|--|
| remainPacketsUI   | integer   | C | 0..1        | This IE shall be included if available.<br>When present, it shall contain the number of packets the UE is allowed to send uplink in the given time unit for the given APN (all PDN connections of the UE to this APN see clause 4.7.7.3 in 3GPP TS 23.401 [33]).                               |
| remainPacketsDI   | integer   | C | 0..1        | This IE shall be included if available.<br>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.<br>When present, it shall indicate the period of time during which the APN rate control status will remain valid.  |
| remainExReportsUI | integer   | C | 0..1        | This IE shall be included if available.<br>When present, it shall indicate the number of additional exception reports the UE is allowed to send uplink in the given time unit for the given APN (all PDN connections of the UE to this APN, see clause 4.7.7.3 in 3GPP TS 23.401 [33]).        |
| remainExReportsDI | integer   | C | 0..1        | This IE shall be included if available.<br>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.<br>true: the UE is battery powered;<br>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.<br>true: the battery of the UE is replaceable;<br>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.<br>true: the battery of UE is rechargeable;<br>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].<br>(NOTE)          |
| acslpv4Addr   | Ipv4Addr  | O | 0..1        | This IE may contain the IPv4 address of the ACS, see BBF TR-069 [34] or BBF TR-369 [35].<br>(NOTE) |
| acslpv6Addr   | Ipv6Addr  | O | 0..1        | This IE may contain the IPv6 address of the ACS, see BBF TR-069 [34] or BBF TR-369 [35].<br>(NOTE) |
| NOTE: At least one of acsUrl, acslpv4Addr, acslpv6Addr shall be included. |           |   |             |  |

## 5.4.4.46 Type: AcsInfoRm

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

## 5.4.4.47 Type: NrV2xAuth

Table 5.4.4.47-1: Definition of type NrV2xAuth

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

## 5.4.4.48 Type: LteV2xAuth

Table 5.4.4.48-1: Definition of type LteV2xAuth

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

## 5.4.4.49 Type: Pc5QoSPara

Table 5.4.4.49-1: Definition of type Pc5QoSPara

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

## 5.4.4.50 Type: Pc5QosFlowItem

Table 5.4.4.50-1: Definition of type Pc5QosFlowItem

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

## 5.4.4.51 Type: Pc5FlowBitRates

Table 5.4.4.51-1: Definition of type Pc5FlowBitRates

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

## 5.4.4.52 Type: UltraLocation

Table 5.4.4.52-1: Definition of type UltraLocation

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

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

## 5.4.4.53 Type: GeraLocation

Table 5.4.4.53-1: Definition of type GeraLocation

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

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

## 5.4.4.54 Type: CellGlobalId

Table 5.4.4.54-1: Definition of type CellGlobalId

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

## 5.4.4.55 Type: ServiceAreald

Table 5.4.4.55-1: Definition of type ServiceAreald

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

## 5.4.4.56 Type: LocationAreald

Table 5.4.4.56-1: Definition of type LocationAreald

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

## 5.4.4.57 Type: RoutingAreald

Table 5.4.4.57-1: Definition of type RoutingAreald

| Attribute name | Data type | P | Cardinality | Description                                       |
|----------------|-----------|---|-------------|---|
| plmnId         | PlmnId    | M | 1           | PLMN Identity                                     |
| lac            | string    | M | 1           | Location Area Code<br>Pattern: '[A-Fa-f0-9]{4}\$' |
| rac            | string    | M | 1           | Routing Area Code<br>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. 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. When present, it shall contain the civic address information of the TNAP 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: sdRanges and wildcardSd shall not be present simultaneously.

## 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.<br><br>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.<br><br>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" }

## 5.4.5 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). |             |   |

## 5.5 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:<br><br>Pattern: <code>^\d+(\.\d+)? (bps Kbps Mbps Gbps Tbps)\$</code><br><br>Examples:<br>"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.  |
| 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.<br>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.<br>Pattern: <code>^[0-9]E-[0-9]\$</code><br><br>Examples:<br>Packer Error Rate $4 \times 10^{-6}$ shall be encoded as "4E-6".<br>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.<br>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.<br>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.<br>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.<br>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.<br>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.<br>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.  |

## 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. |

## 5.5.4 Structured Data Types

### 5.5.4.1 Type: Arp

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

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

### 5.5.4.2 Type: Ambr

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

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



## 5.5.4.3 Type: Dynamic5Qi

Table 5.5.4.3-1: Definition of type Dynamic5Qi

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

## 5.5.4.4 Type: NonDynamic5Qi

Table 5.5.4.4-1: Definition of type NonDynamic5Qi

| Attribute name   | Data type            | P | Cardinality | Description  | Applicability |
|--|----------------------|---|-------------|--|---------------|
| priorityLevel  | 5QIPriorityLevel     | O | 0..1        | Defines the 5QI Priority Level. See clause 5.5.2.<br>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.<br>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.<br>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.<br>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  | ExtPacketDelayBudget | O | 0..1        | Defines the Core Network Packet Delay Budget for downlink. See clause 5.5.2.   |               |
| cnPacketDelayBudgetUL  | ExtPacketDelayBudget | O | 0..1        | Defines the Core Network Packet Delay Budget for uplink. See clause 5.5.2.   |               |
| <p>NOTE 1: Unless specified otherwise in an API: if the maximum data burst volume value to be transmitted is lower than or equal to 4095 Bytes, the maxDataBurstVol IE shall be set to the maximum data burst volume value to be transmitted and the extMaxDataBurstVol IE shall be omitted. If the maximum data burst volume value to be transmitted is greater than 4095 Bytes, the maxDataBurstVol IE shall be set to 4095 Bytes and, if ExtMaxDataBurstVol data type is supported by the sender, the extMaxDataBurstVol IE shall be set to the maximum data burst volume value to be transmitted.</p> <p>NOTE 2: Unless specified otherwise in an API: if both the maxDataBurstVol IE and the extMaxDataBurstVol IE are received, the value in the extMaxDataBurstVol IE shall be used if the receiver supports ExtMaxDataBurstVol data type, otherwise the value in the maxDataBurstVol IE shall be used.</p> |                      |   |             |  |               |

## 5.5.4.5 Type: ArpRm

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

## 5.5.4.6 Type: AmbrRm

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

## 5.5.4.7 Void

### 5.5.4.8 Void

## 5.6 Data Types related to 5G Trace

### 5.6.1 Introduction

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

### 5.6.2 Simple Data Types

This clause specifies common simple data types.

**Table 5.6.2-1: Simple Data Types**

| Type Name    | Type Definition | Description  |
|--------------|-----------------|--|
| PhysCellId   | integer         | integer value identifying the physical cell identity (PCI), as definition of " <i>PhysCellId</i> " IE in clause 6.3.2 of 3GPP TS 38.331 [42].<br><br>Minimum = 0. Maximum = 1007.  |
| ArfcnValueNR | integer         | Integer value indicating the ARFCN applicable for a downlink, uplink or bi-directional (TDD) NR global frequency raster, as definition of " <i>ARFCN-ValueNR</i> " IE in clause 6.3.2 of 3GPP TS 38.331 [42].<br><br>Minimum = 0. Maximum = 3279165. |

### 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 |
| "RLF_REPORTS_ONLY"        | RLF reports only        |
| "RCEF_REPORTS_ONLY"       | RCEF reports only       |
| "LOGGED_MBSFN_MDT"        | Logged MBSFN MDT        |

#### 5.6.3.4 Enumeration: ReportTypeMdt

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

**Table 5.6.3.4-1: Enumeration ReportTypeMdt**

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

#### 5.6.3.5 Enumeration: MeasurementLteForMdt

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

**Table 5.6.3.5-1: Enumeration MeasurementLteForMdt**

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

#### 5.6.3.6 Enumeration: MeasurementNrForMdt

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

**Table 5.6.3.6-1: Enumeration MeasurementNrForMdt**

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

### 5.6.3.7 Enumeration: SensorMeasurement

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

**Table 5.6.3.7-1: Enumeration SensorMeasurement**

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

### 5.6.3.8 Enumeration: ReportingTrigger

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

**Table 5.6.3.8-1: Enumeration ReportingTrigger**

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

### 5.6.3.9 Enumeration: ReportIntervalMdt

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

**Table 5.6.3.9-1: Enumeration ReportIntervalMdt**

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

### 5.6.3.10 Enumeration: ReportAmountMdt

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

**Table 5.6.3.10-1: Enumeration ReportAmountMdt**

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

### 5.6.3.11 Enumeration: EventForMdt

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

**Table 5.6.3.11-1: Enumeration EventForMdt**

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

### 5.6.3.12 Enumeration: LoggingIntervalMdt

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

**Table 5.6.3.12-1: Enumeration LoggingIntervalMdt**

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

### 5.6.3.13 Enumeration: LoggingDurationMdt

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

**Table 5.6.3.13-1: Enumeration LoggingDurationMdt**

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

### 5.6.3.14 Enumeration: PositioningMethodMdt

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

**Table 5.6.3.14-1: Enumeration PositioningMethodMdt**

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

### 5.6.3.15 Enumeration: CollectionPeriodRmmLteMdt

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

**Table 5.6.3.15-1: Enumeration CollectionPeriodRmmLteMdt**

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

### 5.6.3.16 Enumeration: MeasurementPeriodLteMdt

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

**Table 5.6.3.16-1: Enumeration MeasurementPeriodLteMdt**

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

### 5.6.3.17 Enumeration: ReportIntervalNrMdt

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

**Table 5.6.3.17-1: Enumeration ReportIntervalNrMdt**

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

### 5.6.3.18 Enumeration: LoggingIntervalNrMdt

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



**Table 5.6.3.18-1: Enumeration LoggingIntervalNrMdt**

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

### 5.6.3.19 Enumeration: CollectionPeriodRmmNrMdt

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

**Table 5.6.3.19-1: Enumeration CollectionPeriodRmmNrMdt**

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

### 5.6.3.20 Enumeration: LoggingDurationNrMdt

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

**Table 5.6.3.20-1: Enumeration LoggingDurationNrMdt**

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

## 5.6.4 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]).<br><br>It shall be encoded as the concatenation of MCC, MNC and Trace ID as follows:<br><MCC><MNC>-<Trace ID><br><br>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.<br><br>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]).<br><br>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.<br><br>Octets shall be coded according to 3GPP TS 32.422 [19].<br><br>Pattern: '[A-Fa-f0-9]+\$'  |
| eventList                 | string     | M | 1           | Triggering events (see 3GPP TS 32.422 [19]).<br><br>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.<br><br>Octets shall be coded according to 3GPP TS 32.422 [19].<br><br>Pattern: '[A-Fa-f0-9]+\$'   |
| collectionEntityIpv4Addr  | Ipv4Addr   | C | 0..1        | IPv4 Address of the Trace Collection Entity (see 3GPP TS 32.422 [19]).<br>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]).<br>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 | <p>List of Interfaces (see 3GPP TS 32.422 [19]).</p> <p>It shall be encoded as an octet string in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits shall appear first in the string, and the character representing the 4 least significant bit shall appear last in the string.</p> <p>Octets shall be coded according to 3GPP TS 32.422 [19].</p> <p>If this attribute is not present, all the interfaces applicable to the list of NE types indicated in the neTypeList attribute should be traced.</p> <p>Pattern: '[A-Fa-f0-9]+\$'</p> |
|---------------|--------|---|------|--|

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].  |
| 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 or combined Immediate MDT and Trace. When present, this IE shall contain a list of the measurements that shall be collected for NR.   |
| sensorMeasurementList | array(SensorMeasurement)    | O | 1..N        | When present, this IE shall include a list of the sensor measurements to be collected for UE 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 or combined Immediate MDT and Trace. 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 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 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 or NR) and the jobType is configured for Immediate MDT or combined Immediate MDT and Trace. When present, this IE shall indicate the number of measurement reports that shall be taken for periodical reporting while UE is in connected.  |
| 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 or combined Immediate MDT and Trace 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 or combined Immediate MDT and Trace 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 or Immediate MDT and Trace. 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.<br><br>When present, it shall indicate a list of the additional positioning methods that shall be used for the MDT job.<br><br>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.<br>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 or Immediate MDT and Trace and any of the "M4" or "M5" is contained in measurementList attribute in NR.<br><br>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.<br>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.<br>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.<br>Maximum of 8 MBSFN area(s) can be contained.<br>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.  |

### 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.          |
| taclInfoPerPlmn | map(TaclInfo)      | 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 TaclInfo                 |



## 5.6.4.4 Type: TacInfo

Table 5.6.4.4-1: Definition of type TacInfo

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

## 5.6.4.5 Type: MbsfnArea

Table 5.6.4.5-1: Definition of type MbsfnArea

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

## 5.6.4.6 Type: InterFreqTargetInfo

Table 5.6.4.6-1: Definition of type InterFreqTargetInfo

| Attribute name | Data type         | P | Cardinality | Description  |
|----------------|-------------------|---|-------------|--|
| dlCarrierFreq  | ArcfnValueNr      | 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.<br><br>If absent, the UE shall perform measurement logging on all physical cells. |

## 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                       |
| ApplicationChargingId | string          | Application provided charging identifier allowing correlation of charging information. |
| RatingGroup           | Uint32          | Identifier of a Rating Group   |
| ServiceId             | Uint32          | Identifier of a Service  |

### 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  |

---

# 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: '1.2.8'
  title: 'Common Data Types'
  description: |
    Common Data Types for Service Based Interfaces.
    © 2024, 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 16.14.0
  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
  BinaryRm:
    format: binary
    type: string
    nullable: true
  Bytes:
    format: byte
    type: string
  BytesRm:
    format: byte
    type: string
    nullable: true
  Date:
    format: date
    type: string
  DateRm:
    format: date
```

```

    type: string
    nullable: true
DateTime:
  format: date-time
  type: string
DateTimeRm:
  format: date-time
  type: string
  nullable: true
DiameterIdentity:
  type: string
  pattern: '^[A-Za-z0-9]+([-A-Za-z0-9]+)\.[a-z]{2,}$'
DiameterIdentityRm:
  type: string
  pattern: '^[A-Za-z0-9]+([-A-Za-z0-9]+)\.[a-z]{2,}$'
  nullable: true
Double:
  format: double
  type: number
DoubleRm:
  format: double
  type: number
  nullable: true
DurationSec:
  type: integer
DurationSecRm:
  type: integer
  nullable: true
Float:
  format: float
  type: number
FloatRm:
  format: float
  type: number
  nullable: true
Int32:
  format: int32
  type: integer
Int32Rm:
  format: int32
  type: integer
  nullable: true
Int64:
  type: integer
  format: int64
Int64Rm:
  format: int64
  type: integer
  nullable: true
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])$'
  example: '198.51.100.1'
Ipv4AddrRm:
  type: string
  pattern: '^(([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.){3}([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])$'
  example: '198.51.100.1'
  nullable: true
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]))$'
  example: '198.51.0.0/16'
Ipv4AddrMaskRm:
  type: string
  pattern: '^(([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.){3}([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\/([0-9]|[1-2][0-9]|3[0-2]))$'
  example: '198.51.0.0/16'
  nullable: true
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'

```

```

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
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}([^:]+))|((([:]+)*[^:]+)?::(([:]+)*[^:]+)?))(\|.+) $'
  example: '2001:db8:abcd:12::0/64'
Ipv6PrefixRm:
  type: string
  allof:
    - pattern: '^((:|(0?|([1-9a-f][0-9a-f]{0,3})))|((0?|([1-9a-f][0-9a-f]{0,3})))|{0,6}(:|(0?|([1-9a-f][0-9a-f]{0,3})))|(\|([0-9]|[0-9]{2})|(1[0-1][0-9])|(12[0-8])))$)'
    - pattern: '^((([:]+){7}([^:]+))|((([:]+)*[^:]+)?::(([:]+)*[^:]+)?))(\|.+) $'
  nullable: true
MacAddr48:
  type: string
  pattern: '^([0-9a-fA-F]{2})((-[0-9a-fA-F]{2}){5})$'
MacAddr48Rm:
  type: string
  pattern: '^([0-9a-fA-F]{2})((-[0-9a-fA-F]{2}){5})$'
  nullable: true
SupportedFeatures:
  type: string
  pattern: '^[A-Fa-f0-9]*$'
UInteger:
  type: integer
  minimum: 0
UIntegerRm:
  type: integer
  minimum: 0
  nullable: true
Uint16:
  type: integer
  minimum: 0
  maximum: 65535
Uint16Rm:
  type: integer
  minimum: 0
  maximum: 65535
  nullable: true
Uint32:
  type: integer
  minimum: 0
  maximum: 4294967295 #(2^32)-1
Uint32Rm:
  format: int32
  type: integer
  minimum: 0
  maximum: 4294967295 #(2^32)-1
  nullable: true
Uint64:
  type: integer
  minimum: 0
  maximum: 18446744073709551615 #(2^64)-1
Uint64Rm:
  type: integer
  minimum: 0
  maximum: 18446744073709551615 #(2^64)-1
  nullable: true
Uri:
  type: string
UriRm:
  type: string
  nullable: true
VarUeId:
  type: string
  pattern: '^([imsi-[0-9]{5,15}|nai-.+|msisdn-[0-9]{5,15}|extid-[^\@]+\@[^\@]+|gci-.+|gli-.+|.+) $'
VarUeIdRm:
  type: string
  pattern: '^([imsi-[0-9]{5,15}|nai-.+|msisdn-[0-9]{5,15}|extid-[^\@]+\@[^\@]+|gci-.+|gli-.+|.+) $'

```

```

    nullable: true
  TimeZone:
    type: string
  TimeZoneRm:
    type: string
    nullable: true
  StnSr:
    type: string
  StnSrRm:
    type: string
    nullable: true
  CMsisdn:
    type: string
    pattern: '^[0-9]{5,15}$'
  CMsisdnRm:
    type: string
    pattern: '^[0-9]{5,15}$'
    nullable: true
  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).
#
# COMMON ENUMERATED DATA TYPES
#

PatchOperation:
  anyOf:
    - type: string
      enum:
        - add
        - copy
        - move
        - remove
        - replace
        - test
    - type: string
UriScheme:
  anyOf:
    - type: string
      enum:
        - http
        - https
    - type: string
ChangeType:
  anyOf:
    - type: string
      enum:
        - ADD
        - MOVE
        - REMOVE
        - REPLACE
    - type: string
HttpMethod:
  anyOf:
    - type: string
      enum:
        - GET
        - POST
        - PUT
        - DELETE
        - PATCH
        - OPTIONS
        - HEAD
        - CONNECT
        - TRACE
    - type: string
NullValue:
  enum:
    - null

```

```
#
# COMMON STRUCTURED DATA TYPES
#

ProblemDetails:
  type: object
  properties:
    type:
      $ref: '#/components/schemas/Uri'
    title:
      type: string
    status:
      type: integer
    detail:
      type: string
    instance:
      $ref: '#/components/schemas/Uri'
    cause:
      type: string
    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:
      type: string

Link:
  type: object
  properties:
    href:
      $ref: '#/components/schemas/Uri'

LinkRm:
  type: object
  properties:
    href:
      $ref: '#/components/schemas/Uri'
  nullable: true

PatchItem:
  type: object
  properties:
    op:
      $ref: '#/components/schemas/PatchOperation'
    path:
      type: string
    from:
      type: string
    value: {}
  required:
    - op
    - path

LinksValueSchema:
  oneOf:
    - type: array
      items:
        $ref: '#/components/schemas/Link'
      minItems: 1
    - $ref: '#/components/schemas/Link'

SelfLink:
  type: object
  properties:
    self:
      $ref: '#/components/schemas/Link'
  required:
    - self

InvalidParam:
  type: object
  properties:
    param:
      type: string
    reason:
      type: string
  required:
```



```

    - param
ChangeItem:
  type: object
  properties:
    op:
      $ref: '#/components/schemas/ChangeType'
    path:
      type: string
    from:
      type: string
    origValue: {}
    newValue: {}
  required:
    - op
    - path
NotifyItem:
  type: object
  required:
    - resourceId
    - changes
  properties:
    resourceId:
      $ref: '#/components/schemas/Uri'
    changes:
      type: array
      items:
        $ref: '#/components/schemas/ChangeItem'
      minItems: 1
ComplexQuery:
  oneOf:
    - $ref: '#/components/schemas/Cnf'
    - $ref: '#/components/schemas/Dnf'
Cnf:
  type: object
  required:
    - cnfUnits
  properties:
    cnfUnits:
      type: array
      items:
        $ref: '#/components/schemas/CnfUnit'
      minItems: 1
Dnf:
  type: object
  required:
    - dnfUnits
  properties:
    dnfUnits:
      type: array
      items:
        $ref: '#/components/schemas/DnfUnit'
      minItems: 1
CnfUnit:
  type: object
  required:
    - cnfUnit
  properties:
    cnfUnit:
      type: array
      items:
        $ref: '#/components/schemas/Atom'
      minItems: 1
DnfUnit:
  type: object
  required:
    - dnfUnit
  properties:
    dnfUnit:
      type: array
      items:
        $ref: '#/components/schemas/Atom'
      minItems: 1
Atom:
  type: object
  required:
    - attr
    - value
  properties:

```

```
    attr:
      type: string
      value: {}
      negative:
        type: boolean
  PatchResult:
    type: object
    required:
      - report
    properties:
      report:
        type: array
        items:
          $ref: '#/components/schemas/ReportItem'
        minItems: 1
  ReportItem:
    type: object
    required:
      - path
    properties:
      path:
        type: string
  HalTemplate:
    type: object
    required:
      - method
    properties:
      title:
        type: string
      method:
        $ref: '#/components/schemas/HttpMethod'
      contentType:
        type: string
      properties:
        type: array
        items:
          $ref: '#/components/schemas/Property'
        minItems: 1
  Property:
    type: object
    required:
      - name
    properties:
      name:
        type: string
      required:
        type: boolean
      regex:
        type: string
      value:
        type: string
  RedirectResponse:
    type: object
    properties:
      cause:
        type: string
      targetScp:
        $ref: '#/components/schemas/Uri'
      targetSepp:
        $ref: '#/components/schemas/Uri'
```

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

```
#
# SIMPLE DATA TYPES
#
```

```
  Dnn:
    type: string
  DnnRm:
    type: string
    nullable: true
  WildcardDnn:
    type: string
```

```

    pattern: '^[*]$'
WildcardDnnRm:
  type: string
  pattern: '^[*]$'
  nullable: true
Gpsi:
  type: string
  pattern: '^(\msisd-[0-9]{5,15}|extid-[^\@]+\@[^\@]+|.+)$$'
GpsiRm:
  type: string
  pattern: '^(\msisd-[0-9]{5,15}|extid-[^\@]+\@[^\@]+|.+)$$'
  nullable: true
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}$'
GroupIdRm:
  type: string
  pattern: '^[A-Fa-f0-9]{8}-[0-9]{3}-[0-9]{2,3}-([A-Fa-f0-9][A-Fa-f0-9]){1,10}$'
  nullable: true
ExternalGroupId:
  type: string
  pattern: '^extgroupid-[^\@]+\@[^\@]+$$'
ExternalGroupIdRm:
  type: string
  pattern: '^extgroupid-[^\@]+\@[^\@]+$$'
  nullable: true
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})|.+)$$'
PeiRm:
  type: string
  pattern: '^(\imei-[0-9]{15}|imeisv-[0-9]{16}|mac((-[0-9a-fA-F]{2}){6})(-untrusted)?|eui((-[0-9a-fA-F]{2}){8})|.+)$$'
  nullable: true
Supi:
  type: string
  pattern: '^(\imsi-[0-9]{5,15}|nai-.+|gci-.+|gli-.+|.+)$$'
SupiRm:
  type: string
  pattern: '^(\imsi-[0-9]{5,15}|nai-.+|gci-.+|gli-.+|.+)$$'
  nullable: true
NfInstanceId:
  type: string
  format: uuid
AmfId:
  type: string
  pattern: '^[A-Fa-f0-9]{6}$'
AmfRegionId:
  type: string
  pattern: '^[A-Fa-f0-9]{2}$'
AmfSetId:
  type: string
  pattern: '^([0-3][A-Fa-f0-9]{2})$$'
RfspIndex:
  type: integer
  minimum: 1
  maximum: 256
RfspIndexRm:
  type: integer
  minimum: 1
  maximum: 256
  nullable: true
NfGroupId:
  type: string
MtcProviderInformation:
  type: string
CagId:
  type: string
  pattern: '^[A-Fa-f0-9]{8}$'
SupiOrSuci:
  type: string
  pattern: '^(\imsi-[0-9]{5,15}|nai-.+|gli-.+|gci-.+|suci-(0-[0-9]{3}-[0-9]{2,3}|[1-7]-.+) - [0-9]{1,4} - (0-0-.+|[a-fA-F1-9]-([1-9]|[1-9][0-9]|1[0-9]{2}|2[0-4][0-9]|25[0-5])-[a-fA-F0-9]+)|.+)$$'
#
# STRUCTURED DATA TYPES
#

```

```

Guami:
  type: object
  properties:
    plmnId:
      $ref: '#/components/schemas/PlmnIdNid'
    amfId:
      $ref: '#/components/schemas/AmfId'
  required:
    - plmnId
    - amfId
GuamiRm:
  anyOf:
    - $ref: '#/components/schemas/Guami'
    - $ref: '#/components/schemas/NullValue'
NetworkId:
  type: object
  properties:
    mnc:
      $ref: '#/components/schemas/Mnc'
    mcc:
      $ref: '#/components/schemas/Mcc'

```

```

#
# Data Types related to 5G Network as defined in clause 5.4
#

```

```

#
# SIMPLE DATA TYPES
#

```

```

ApplicationId:
  type: string
ApplicationIdRm:
  type: string
  nullable: true
PduSessionId:
  type: integer
  minimum: 0
  maximum: 255
Mcc:
  type: string
  pattern: '^d{3}$'
MccRm:
  type: string
  pattern: '^d{3}$'
  nullable: true
Mnc:
  type: string
  pattern: '^d{2,3}$'
MncRm:
  type: string
  pattern: '^d{2,3}$'
  nullable: true
Tac:
  type: string
  pattern: '^[A-Fa-f0-9]{4}$|^[A-Fa-f0-9]{6}$'
TacRm:
  type: string
  pattern: '^[A-Fa-f0-9]{4}$|^[A-Fa-f0-9]{6}$'
  nullable: true
EutraCellId:
  type: string
  pattern: '^[A-Fa-f0-9]{7}$'
EutraCellIdRm:
  type: string
  pattern: '^[A-Fa-f0-9]{7}$'
  nullable: true
NrCellId:
  type: string
  pattern: '^[A-Fa-f0-9]{9}$'
NrCellIdRm:
  type: string
  pattern: '^[A-Fa-f0-9]{9}$'
  nullable: true
Dnai:
  type: string
DnaiRm:
  type: string

```

```

    nullable: true
  5GmmCause:
    $ref: '#/components/schemas/UInteger'
  AmfName:
    type: string
  AreaCode:
    type: string
  AreaCodeRm:
    type: string
    nullable: true
  N3Iwfid:
    type: string
    pattern: '^[A-Fa-f0-9]+$'
  WAgfid:
    type: string
    pattern: '^[A-Fa-f0-9]+$'
  Tngfid:
    type: string
    pattern: '^[A-Fa-f0-9]+$'
  NgeNbId:
    type: string
    pattern: '^(MacroNGeNB-[A-Fa-f0-9]{5}|LMacroNGeNB-[A-Fa-f0-9]{6}|SMacroNGeNB-[A-Fa-f0-9]{5})$'
  Nid:
    type: string
    pattern: '^[A-Fa-f0-9]{11}$'
  NidRm:
    type: string
    pattern: '^[A-Fa-f0-9]{11}$'
    nullable: true
  NfSetId:
    type: string
  NfServiceSetId:
    type: string
  PlmnAssiUeRadioCapId:
    $ref: '#/components/schemas/Bytes'
  ManAssiUeRadioCapId:
    $ref: '#/components/schemas/Bytes'
  TypeAllocationCode:
    type: string
    pattern: '^[0-9]{8}$'
  HfcNid:
    type: string
    maxLength: 6
  HfcNidRm:
    type: string
    maxLength: 6
    nullable: true
  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})$'
  Gli:
    $ref: '#/components/schemas/Bytes'
  Gci:
    type: string

#
# ENUMERATED DATA TYPES
#

AccessType:
  type: string
  enum:
    - 3GPP_ACCESS
    - NON_3GPP_ACCESS
  AccessTypeRm:
    anyOf:
      - $ref: '#/components/schemas/AccessType'
      - $ref: '#/components/schemas/NullValue'
  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
  - type: string
RatTypeRm:
  anyOf:
    - $ref: '#/components/schemas/RatType'
    - $ref: '#/components/schemas/NullValue'
PduSessionType:
  anyOf:
    - type: string
    enum:
      - IPV4
      - IPV6
      - IPV4V6
      - UNSTRUCTURED
      - ETHERNET
    - type: string
PduSessionTypeRm:
  anyOf:
    - $ref: '#/components/schemas/PduSessionType'
    - $ref: '#/components/schemas/NullValue'
UpIntegrity:
  anyOf:
    - type: string
    enum:
      - REQUIRED
      - PREFERRED
      - NOT_NEEDED
    - type: string
UpIntegrityRm:
  anyOf:
    - $ref: '#/components/schemas/UpIntegrity'
    - $ref: '#/components/schemas/NullValue'
UpConfidentiality:
  anyOf:
    - type: string
    enum:
      - REQUIRED
      - PREFERRED
      - NOT_NEEDED
    - type: string
UpConfidentialityRm:
  anyOf:
    - $ref: '#/components/schemas/UpConfidentiality'
    - $ref: '#/components/schemas/NullValue'
SscMode:
  anyOf:
    - type: string
    enum:
      - SSC_MODE_1
      - SSC_MODE_2
      - SSC_MODE_3
    - type: string
SscModeRm:
  anyOf:
    - $ref: '#/components/schemas/SscMode'
    - $ref: '#/components/schemas/NullValue'
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'

RestrictionType:

anyOf:

- type: string
  - enum:
    - ALLOWED\_AREAS
    - NOT\_ALLOWED\_AREAS
- type: string

RestrictionTypeRm:

anyOf:

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

CoreNetworkType:

anyOf:

- type: string
  - enum:
    - 5GC
    - EPC
- type: string

CoreNetworkTypeRm:

anyOf:

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

PresenceState:

anyOf:

- type: string
  - enum:
    - IN\_AREA
    - OUT\_OF\_AREA
    - UNKNOWN
    - INACTIVE
- type: string

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'

ScheduledCommunicationType:

anyOf:

- type: string
  - enum:
    - DOWNLINK\_ONLY
    - UPLINK\_ONLY
    - BIDIRECTIONAL
- type: string

ScheduledCommunicationTypeRm:

anyOf:

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

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'
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
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'
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.
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.

```

```

#
# STRUCTURED DATA TYPES
#

```

```

Snssai:
  type: object
  properties:
    sst:
      type: integer
      minimum: 0
      maximum: 255
    sd:
      type: string
      pattern: '^[A-Fa-f0-9]{6}$'
  required:
    - sst

PlmnId:
  type: object
  properties:
    mcc:
      $ref: '#/components/schemas/Mcc'
    mnc:
      $ref: '#/components/schemas/Mnc'
  required:
    - mcc
    - mnc

PlmnIdRm:
  anyOf:
    - $ref: '#/components/schemas/PlmnId'
    - $ref: '#/components/schemas/NullValue'

Tai:
  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'
Ecgi:
  type: object
  properties:
    plmnId:
      $ref: '#/components/schemas/PlmnId'
      # PLMN Identity
    eutraCellId:
      $ref: '#/components/schemas/EutraCellId'
    nid:
      $ref: '#/components/schemas/Nid'
  required:
    - plmnId
    - eutraCellId
EcgiRm:
  anyOf:
    - $ref: '#/components/schemas/Ecgi'
    - $ref: '#/components/schemas/NullValue'
Ncgi:
  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'
UserLocation:
  type: object
  properties:
    eutraLocation:
      $ref: '#/components/schemas/EutraLocation'
    nrLocation:
      $ref: '#/components/schemas/NrLocation'
    n3gaLocation:
      $ref: '#/components/schemas/N3gaLocation'
    ultraLocation:
      $ref: '#/components/schemas/UltraLocation'
    geraLocation:
      $ref: '#/components/schemas/GeraLocation'
EutraLocation:
  type: object
  properties:
    tai:
      $ref: '#/components/schemas/Tai'
    ignoreTai:
      type: boolean
      default: false
    ecgi:
      $ref: '#/components/schemas/Ecgi'
    ignoreEcgi:
      type: boolean
      default: false
    ageOfLocationInformation:
      type: integer
      minimum: 0
      maximum: 32767
    ueLocationTimestamp:
      $ref: '#/components/schemas/DateTime'
    geographicalInformation:
      type: string
      pattern: '^[0-9A-F]{16}$'
    geodeticInformation:
      type: string
      pattern: '^[0-9A-F]{20}$'
    globalNgenbId:
      $ref: '#/components/schemas/GlobalRanNodeId'
    globalENbId:
      $ref: '#/components/schemas/GlobalRanNodeId'
  required:
    - tai

```

```

    - ecgi
  EutraLocationRm:
    anyOf:
      - $ref: '#/components/schemas/EutraLocation'
      - $ref: '#/components/schemas/NullValue'
  NrLocation:
    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
      ueLocationTimestamp:
        $ref: '#/components/schemas/DateTime'
      geographicalInformation:
        type: string
        pattern: '^([0-9A-F]){16}$'
      geodeticInformation:
        type: string
        pattern: '^([0-9A-F]){20}$'
      globalGnbId:
        $ref: '#/components/schemas/GlobalRanNodeId'
    required:
      - tai
      - ncgi
  NrLocationRm:
    anyOf:
      - $ref: '#/components/schemas/NrLocation'
      - $ref: '#/components/schemas/NullValue'
  N3gaLocation:
    type: object
    properties:
      n3gppTai:
        $ref: '#/components/schemas/Tai'
      n3lwfId:
        type: string
        pattern: '^([A-Fa-f0-9])+$'
      ueIpv4Addr:
        $ref: '#/components/schemas/Ipv4Addr'
      ueIpv6Addr:
        $ref: '#/components/schemas/Ipv6Addr'
      portNumber:
        $ref: '#/components/schemas/UInteger'
      tnapId:
        $ref: '#/components/schemas/TnapId'
      protocol:
        $ref: '#/components/schemas/TransportProtocol'
      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:
    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'

```

```
NgApCause:
  type: object
  properties:
    group:
      $ref: '#/components/schemas/UInteger'
    value:
      $ref: '#/components/schemas/UInteger'
  required:
    - group
    - value
BackupAmfInfo:
  type: object
  properties:
    backupAmf:
      $ref: '#/components/schemas/AmfName'
    guamiList:
      type: array
      items:
        $ref: '#/components/schemas/Guami'
      minItems: 1
  required:
    - backupAmf
RefToBinaryData:
  type: object
  properties:
    contentId:
      type: string
  required:
    - contentId
RefToBinaryDataRm:
  anyOf:
    - $ref: '#/components/schemas/RefToBinaryData'
    - $ref: '#/components/schemas/NullValue'
RouteToLocation:
  type: object
  properties:
    dnai:
      $ref: '#/components/schemas/Dnai'
    routeInfo:
      $ref: '#/components/schemas/RouteInformation'
    routeProfId:
      type: string
      nullable: true
  required:
    - dnai
  anyOf:
    - required: [ routeInfo ]
    - required: [ routeProfId ]
  nullable: true
RouteInformation:
  type: object
  properties:
    ipv4Addr:
      $ref: '#/components/schemas/Ipv4Addr'
    ipv6Addr:
      $ref: '#/components/schemas/Ipv6Addr'
    portNumber:
      $ref: '#/components/schemas/UInteger'
  required:
    - portNumber
  nullable: true
SubscribedDefaultQos:
  type: object
  required:
    - 5qi
    - arp
  properties:
    5qi:
      $ref: '#/components/schemas/5Qi'
    arp:
      $ref: '#/components/schemas/Arp'
    priorityLevel:
      $ref: '#/components/schemas/5QiPriorityLevel'
Area:
  type: object
  oneOf:
    - required:
        - tacs
```

```

- required:
- areaCode
properties:
  tacs:
    type: array
    items:
      $ref: '#/components/schemas/Tac'
    minItems: 1
  areaCode:
    $ref: '#/components/schemas/AreaCode'
ServiceAreaRestriction:
  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 ]
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'
WirelineServiceAreaRestriction:
  type: object
  properties:

```

```
restrictionType:
  $ref: '#/components/schemas/RestrictionType'
areas:
  type: array
  items:
    $ref: '#/components/schemas/WirelineArea'
PresenceInfo:
  type: object
  properties:
    praId:
      type: string
    additionalPraId:
      type: string
    presenceState:
      $ref: '#/components/schemas/PresenceState'
    trackingAreaList:
      type: array
      items:
        $ref: '#/components/schemas/Tai'
      minItems: 1
    ecgiList:
      type: array
      items:
        $ref: '#/components/schemas/Ecgi'
      minItems: 1
    ncgiList:
      type: array
      items:
        $ref: '#/components/schemas/Ncgi'
      minItems: 1
    globalRanNodeIdList:
      type: array
      items:
        $ref: '#/components/schemas/GlobalRanNodeId'
      minItems: 1
    globaleNbIdList:
      type: array
      items:
        $ref: '#/components/schemas/GlobalRanNodeId'
      minItems: 1
PresenceInfoRm:
  type: object
  properties:
    praId:
      type: string
    additionalPraId:
      type: string
    presenceState:
      $ref: '#/components/schemas/PresenceState'
    trackingAreaList:
      type: array
      items:
        $ref: '#/components/schemas/Tai'
      minItems: 0
    ecgiList:
      type: array
      items:
        $ref: '#/components/schemas/Ecgi'
      minItems: 0
    ncgiList:
      type: array
      items:
        $ref: '#/components/schemas/Ncgi'
      minItems: 0
    globalRanNodeIdList:
      type: array
      items:
        $ref: '#/components/schemas/GlobalRanNodeId'
    globaleNbIdList:
      type: array
      items:
        $ref: '#/components/schemas/GlobalRanNodeId'
      minItems: 1
  nullable: true
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:
    $ref: '#/components/schemas/ENbId'
  oneOf:
    - required: [ n3IwfId ]
    - required: [ gNbId ]
    - required: [ ngeNbId ]
    - required: [ wagfId ]
    - required: [ tngfId ]
    - required: [ eNbId ]
  required:
    - plmnId
  GNbId:
    type: object
    properties:
      bitLength:
        type: integer
        minimum: 22
        maximum: 32
      gNBValue:
        type: string
        pattern: '^[A-Fa-f0-9]{6,8}$'
    required:
      - bitLength
      - gNBValue
  AtsssCapability:
    type: object
    properties:
      atsssLL:
        type: boolean
        default: false
      mptcp:
        type: boolean
        default: false
      rttWithoutPmf:
        type: boolean
        default: false
  PlmnIdNid:
    type: object
    required:
      - mcc
      - mnc
    properties:
      mcc:
        $ref: '#/components/schemas/Mcc'
      mnc:
        $ref: '#/components/schemas/Mnc'
      nid:
        $ref: '#/components/schemas/Nid'
  SmallDataRateStatus:
    type: object
    properties:
      remainPacketsUl:
        type: integer
        minimum: 0
      remainPacketsDl:
        type: integer
        minimum: 0
      validityTime:
        $ref: '#/components/schemas/DateTime'
      remainExReportsUl:
        type: integer
        minimum: 0
      remainExReportsDl:
        type: integer
        minimum: 0

```

```

ApnRateStatus:
  type: object
  properties:
    remainPacketsUl:
      type: integer
      minimum: 0
    remainPacketsDl:
      type: integer
      minimum: 0
    validityTime:
      $ref: '#/components/schemas/DateTime'
    remainExReportsUl:
      type: integer
      minimum: 0
    remainExReportsDl:
      type: integer
      minimum: 0
HfcNodeId:
  type: object
  required:
    - hfcNid
  properties:
    hfcNid:
      $ref: '#/components/schemas/HfcNid'
HfcNodeIdRm:
  anyOf:
    - $ref: '#/components/schemas/HfcNodeId'
    - $ref: '#/components/schemas/NullValue'
ScheduledCommunicationTime:
  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'
BatteryIndication:
  type: object
  properties:
    batteryInd:
      type: boolean
    replaceableInd:
      type: boolean
    rechargeableInd:
      type: boolean
BatteryIndicationRm:
  anyOf:
    - $ref: '#/components/schemas/BatteryIndication'
    - $ref: '#/components/schemas/NullValue'
AcsInfo:
  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'
NrV2xAuth:
  type: object
  properties:
    vehicleUeAuth:
      $ref: '#/components/schemas/UeAuth'

```



```

    pedestrianUeAuth:
      $ref: '#/components/schemas/UeAuth'
LteV2xAuth:
  type: object
  properties:
    vehicleUeAuth:
      $ref: '#/components/schemas/UeAuth'
    pedestrianUeAuth:
      $ref: '#/components/schemas/UeAuth'
Pc5QoSPara:
  type: object
  required:
    - pc5QosFlowList
  properties:
    pc5QosFlowList:
      type: array
      items:
        $ref: '#/components/schemas/Pc5QosFlowItem'
    pc5LinkAmbr:
      $ref: '#/components/schemas/BitRate'
Pc5QosFlowItem:
  type: object
  required:
    - pqi
  properties:
    pqi:
      $ref: '#/components/schemas/5Qi'
    pc5FlowBitRates:
      $ref: '#/components/schemas/Pc5FlowBitRates'
    range:
      $ref: '#/components/schemas/UInteger'
Pc5FlowBitRates:
  type: object
  properties:
    guaFbr:
      $ref: '#/components/schemas/BitRate'
    maxFbr:
      $ref: '#/components/schemas/BitRate'
UltraLocation:
  type: object
  oneOf:
    - required:
        - cgi
    - required:
        - sai
    - required:
        - lai
  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
    ueLocationTimestamp:
      $ref: '#/components/schemas/DateTime'
    geographicalInformation:
      type: string
      pattern: '^[0-9A-F]{16}$'
    geodeticInformation:
      type: string
      pattern: '^[0-9A-F]{20}$'
GeraLocation:
  type: object
  oneOf:
    - required:
        - cgi
    - required:
        - sai
    - required:
        - lai
  properties:

```

```

locationNumber:
  type: string
cgi:
  $ref: '#/components/schemas/CellGlobalId'
sai:
  $ref: '#/components/schemas/ServiceAreaId'
lai:
  $ref: '#/components/schemas/LocationAreaId'
rai:
  $ref: '#/components/schemas/RoutingAreaId'
vlrNumber:
  type: string
mscNumber:
  type: string
ageOfLocationInformation:
  type: integer
  minimum: 0
  maximum: 32767
ueLocationTimestamp:
  $ref: '#/components/schemas/DateTime'
geographicalInformation:
  type: string
  pattern: '^[0-9A-F]{16}$'
geodeticInformation:
  type: string
  pattern: '^[0-9A-F]{20}$'
CellGlobalId:
  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:
  type: object
  required:
    - plmnId
    - lac
    - sac
  properties:
    plmnId:
      $ref: '#/components/schemas/PlmnId'
    lac:
      type: string
      pattern: '^[A-Fa-f0-9]{4}$'
    sac:
      type: string
      pattern: '^[A-Fa-f0-9]{4}$'
LocationAreaId:
  type: object
  required:
    - plmnId
    - lac
  properties:
    plmnId:
      $ref: '#/components/schemas/PlmnId'
    lac:
      type: string
      pattern: '^[A-Fa-f0-9]{4}$'
RoutingAreaId:
  type: object
  required:
    - plmnId
    - lac
    - rac
  properties:
    plmnId:
      $ref: '#/components/schemas/PlmnId'
    lac:
      type: string

```

```

    pattern: '^[A-Fa-f0-9]{4}$'
  rac:
    type: string
    pattern: '^[A-Fa-f0-9]{2}$'
DddTrafficDescriptor:
  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:
  type: object
  required:
    - counter
  properties:
    counter:
      type: integer
    timeStamp:
      $ref: '#/components/schemas/DateTime'
NssaaStatus:
  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'
TnapId:
  type: object
  properties:
    ssId:
      type: string
    bssId:
      type: string
    civicAddress:
      $ref: '#/components/schemas/Bytes'
TnapIdRm:
  anyOf:
    - $ref: '#/components/schemas/TnapId'
    - $ref: '#/components/schemas/NullValue'
TwapId:
  type: object
  required:
    - ssId
  properties:
    ssId:
      type: string
    bssId:
      type: string
    civicAddress:
      $ref: '#/components/schemas/Bytes'
TwapIdRm:
  anyOf:
    - $ref: '#/components/schemas/TwapId'
    - $ref: '#/components/schemas/NullValue'
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'

  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}$'
      end:
        type: string
        pattern: '^[A-Fa-f0-9]{6}$'

#
# Data types describing alternative data types or combinations of data types
#
  ExtSnssai:
    allOf:
      - $ref: '#/components/schemas/Snssai'
      - $ref: '#/components/schemas/SnssaiExtension'

#
# Data Types related to 5G QoS as defined in clause 5.5
#
#
# SIMPLE DATA TYPES
#
  Qfi:
    type: integer
    minimum: 0
    maximum: 63
  QfiRm:
    type: integer
    minimum: 0
    maximum: 63
    nullable: true
  5Qi:
    type: integer
    minimum: 0
    maximum: 255
  5QiRm:
    type: integer
    minimum: 0
    maximum: 255
    nullable: true
  BitRate:
    type: string

```

```
    pattern: '^\\d+(\\.\\d+)? (bps|Kbps|Mbps|Gbps|Tbps)$'
BitRateRm:
  type: string
  pattern: '^\\d+(\\.\\d+)? (bps|Kbps|Mbps|Gbps|Tbps)$'
  nullable: true
ArpPriorityLevelRm:
  type: integer
  minimum: 1
  maximum: 15
  nullable: true
ArpPriorityLevel:
  type: integer
  minimum: 1
  maximum: 15
  nullable: true
  description: nullable true shall not be used for this attribute
5QiPriorityLevel:
  type: integer
  minimum: 1
  maximum: 127
5QiPriorityLevelRm:
  type: integer
  minimum: 1
  maximum: 127
  nullable: true
PacketDelBudget:
  type: integer
  minimum: 1
PacketDelBudgetRm:
  type: integer
  minimum: 1
  nullable: true
PacketErrRate:
  type: string
  pattern: '^([0-9]E-[0-9])$'
PacketErrRateRm:
  type: string
  pattern: '^([0-9]E-[0-9])$'
  nullable: true
PacketLossRate:
  type: integer
  minimum: 0
  maximum: 1000
PacketLossRateRm:
  type: integer
  minimum: 0
  maximum: 1000
  nullable: true
AverWindow:
  type: integer
  minimum: 1
  maximum: 4095
  default: 2000
AverWindowRm:
  type: integer
  maximum: 4095
  default: 2000
  minimum: 1
  nullable: true
MaxDataBurstVol:
  type: integer
  minimum: 1
  maximum: 4095
MaxDataBurstVolRm:
  type: integer
  minimum: 1
  maximum: 4095
  nullable: true
SamplingRatio:
  type: integer
  minimum: 1
  maximum: 100
SamplingRatioRm:
  type: integer
  minimum: 1
  maximum: 100
  nullable: true
RgWirelineCharacteristics:
```

```

    $ref: '#/components/schemas/Bytes'
  RgWirelineCharacteristicsRm:
    anyOf:
      - $ref: '#/components/schemas/RgWirelineCharacteristics'
      - $ref: '#/components/schemas/NullValue'
  ExtMaxDataBurstVol:
    type: integer
    minimum: 4096
    maximum: 2000000
  ExtMaxDataBurstVolRm:
    type: integer
    minimum: 4096
    maximum: 2000000
    nullable: true
  ExtPacketDelBudget:
    type: integer
    minimum: 1
  ExtPacketDelBudgetRm:
    type: integer
    minimum: 1
    nullable: true

```

```

#
# ENUMERATED DATA TYPES
#

```

```

  PreemptionCapability:
    anyOf:
      - type: string
        enum:
          - NOT_PREEMPT
          - MAY_PREEMPT
      - type: string
  PreemptionCapabilityRm:
    anyOf:
      - $ref: '#/components/schemas/PreemptionCapability'
      - $ref: '#/components/schemas/NullValue'
  PreemptionVulnerability:
    anyOf:
      - type: string
        enum:
          - NOT_PREEMPTABLE
          - PREEMPTABLE
      - type: string
  PreemptionVulnerabilityRm:
    anyOf:
      - $ref: '#/components/schemas/PreemptionVulnerability'
      - $ref: '#/components/schemas/NullValue'
  ReflectiveQoSAttribute:
    anyOf:
      - type: string
        enum:
          - RQOS
          - NO_RQOS
      - type: string
  ReflectiveQoSAttributeRm:
    anyOf:
      - $ref: '#/components/schemas/ReflectiveQoSAttribute'
      - $ref: '#/components/schemas/NullValue'
  NotificationControl:
    anyOf:
      - type: string
        enum:
          - REQUESTED
          - NOT_REQUESTED
      - type: string
  NotificationControlRm:
    anyOf:
      - $ref: '#/components/schemas/NotificationControl'
      - $ref: '#/components/schemas/NullValue'
  QoSResourceType:
    anyOf:
      - type: string
        enum:
          - NON_GBR
          - NON_CRITICAL_GBR
          - CRITICAL_GBR
      - type: string

```

```
QosResourceTypeRm:
  anyOf:
    - $ref: '#/components/schemas/QosResourceType'
    - $ref: '#/components/schemas/NullValue'
AdditionalQosFlowInfo:
  anyOf:
    - anyOf:
      - type: string
      enum:
        - MORE_LIKELY
      - type: string
    - $ref: '#/components/schemas/NullValue'
#
#
# STRUCTURED DATA TYPES
#
Arp:
  type: object
  properties:
    priorityLevel:
      $ref: '#/components/schemas/ArpPriorityLevel'
    preemptCap:
      $ref: '#/components/schemas/PreemptionCapability'
    preemptVuln:
      $ref: '#/components/schemas/PreemptionVulnerability'
  required:
    - priorityLevel
    - preemptCap
    - preemptVuln
ArpRm:
  anyOf:
    - $ref: '#/components/schemas/Arp'
    - $ref: '#/components/schemas/NullValue'
Ambr:
  type: object
  properties:
    uplink:
      $ref: '#/components/schemas/BitRate'
    downlink:
      $ref: '#/components/schemas/BitRate'
  required:
    - uplink
    - downlink
AmbrRm:
  anyOf:
    - $ref: '#/components/schemas/Ambr'
    - $ref: '#/components/schemas/NullValue'
Dynamic5Qi:
  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:
```

```
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

#
# Data Types related to 5G Trace as defined in clause 5.6
#

#
# SIMPLE DATA TYPES
#
PhysCellId:
  type: integer
  minimum: 0
  maximum: 1007
ArfcnValueNR:
  type: integer
  minimum: 0
  maximum: 3279165

#
# Enumerations
#
TraceDepth:
  anyOf:
    - type: string
      enum:
        - MINIMUM
        - MEDIUM
        - MAXIMUM
        - MINIMUM_WO_VENDOR_EXTENSION
        - MEDIUM_WO_VENDOR_EXTENSION
        - MAXIMUM_WO_VENDOR_EXTENSION
    - type: string
TraceDepthRm:
  anyOf:
    - $ref: '#/components/schemas/TraceDepth'
    - $ref: '#/components/schemas/NullValue'
JobType:
  anyOf:
    - type: string
      enum:
        - IMMEDIATE_MDT_ONLY
        - LOGGED_MDT_ONLY
        - TRACE_ONLY
        - IMMEDIATE_MDT_AND_TRACE
        - RLF_REPORTS_ONLY
        - RCEF_REPORTS_ONLY
        - LOGGED_MBSFN_MDT
    - type: string
ReportTypeMdt:
  anyOf:
    - type: string
      enum:
        - PERIODICAL
        - EVENT_TRIGGERED
    - type: string
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
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
SensorMeasurement:
  anyOf:
    - type: string
      enum:
        - BAROMETRIC_PRESSURE
        - UE_SPEED
        - UE_ORIENTATION
    - type: string
ReportingTrigger:
  anyOf:
    - type: string
      enum:
        - PERIODICAL
        - EVENT_A2
        - EVENT_A2_PERIODIC
        - ALL_RRM_EVENT_TRIGGERS
    - type: string
ReportIntervalMdt:
  anyOf:
    - type: string
      enum:
        - 120
        - 240
        - 480
        - 640
        - 1024
        - 2048
        - 5120
        - 10240
        - 60000
        - 360000
        - 720000
        - 1800000
        - 3600000
    - type: string
ReportAmountMdt:
  anyOf:
    - type: string
      enum:
        - 1
        - 2
        - 4
        - 8
        - 16
        - 32
        - 64
        - infinity
    - type: string
EventForMdt:
  anyOf:
    - type: string
```

```
enum:
  - OUT_OF_COVERAG
  - A2_EVENT
- type: string
LoggingIntervalMdt:
  anyOf:
    - type: string
      enum:
        - 128
        - 256
        - 512
        - 1024
        - 2048
        - 3072
        - 4096
        - 6144
    - type: string
LoggingDurationMdt:
  anyOf:
    - type: string
      enum:
        - 600
        - 1200
        - 2400
        - 3600
        - 5400
        - 7200
    - type: string
PositioningMethodMdt:
  anyOf:
    - type: string
      enum:
        - GNSS
        - E_CELL_ID
    - type: string
CollectionPeriodRmmLteMdt:
  anyOf:
    - type: string
      enum:
        - 1024
        - 1280
        - 2048
        - 2560
        - 5120
        - 10240
        - 60000
    - type: string
MeasurementPeriodLteMdt:
  anyOf:
    - type: string
      enum:
        - 1024
        - 1280
        - 2048
        - 2560
        - 5120
        - 10240
        - 60000
    - type: string
ReportIntervalNrMdt:
  anyOf:
    - type: string
      enum:
        - 120
        - 240
        - 480
        - 640
        - 1024
        - 2048
        - 5120
        - 10240
        - 20480
        - 40960
        - 60000
        - 360000
        - 720000
        - 1800000
```

```

    - 3600000
    - type: string

LoggingIntervalNrMdt:
  anyOf:
    - type: string
      enum:
        - 128
        - 256
        - 512
        - 1024
        - 2048
        - 3072
        - 4096
        - 6144
        - 320
        - 640
        - infinity
    - type: string

CollectionPeriodRmmNrMdt:
  anyOf:
    - type: string
      enum:
        - 1024
        - 2048
        - 5120
        - 10240
        - 60000
    - type: string

LoggingDurationNrMdt:
  anyOf:
    - type: string
      enum:
        - 600
        - 1200
        - 2400
        - 3600
        - 5400
        - 7200
    - type: string

#
# STRUCTURED DATA TYPES
#
TraceData:
  type: object
  nullable: true
  properties:
    traceRef:
      type: string
      pattern: '^[0-9]{3}[0-9]{2,3}-[A-Fa-f0-9]{6}$'
    traceDepth:
      $ref: '#/components/schemas/TraceDepth'
    neTypeList:
      type: string
      pattern: '^[A-Fa-f0-9]+$'
    eventList:
      type: string
      pattern: '^[A-Fa-f0-9]+$'
    collectionEntityIpv4Addr:
      $ref: '#/components/schemas/Ipv4Addr'
    collectionEntityIpv6Addr:
      $ref: '#/components/schemas/Ipv6Addr'
    traceReportingConsumerUri:
      $ref: '#/components/schemas/Uri'
    interfaceList:
      type: string
      pattern: '^[A-Fa-f0-9]+$'
  required:
    - traceRef
    - traceDepth
    - neTypeList
    - eventList
MdtConfiguration:
  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'
  eventThresholdRsrp:
    type: integer
    minimum: 0
    maximum: 97
  eventThresholdRsrpNr:
    type: integer
    minimum: 0
    maximum: 127
  eventThresholdRsrq:
    type: integer
    minimum: 0
    maximum: 34
  eventThresholdRsrqNr:
    type: integer
    minimum: 0
    maximum: 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:
  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'
TacInfo:
  type: object
  required:
    - tacList
  properties:
    tacList:
      type: array
      items:
        $ref: '#/components/schemas/Tac'
      minItems: 1
MbsfnArea:
  type: object
  properties:
    mbsfnAreaId:
      type: integer
      minimum: 0
      maximum: 255
    carrierFrequency:
      type: integer
      minimum: 0
      maximum: 262143
InterFreqTargetInfo:
  required:
    - dlCarrierFreq
  type: object
  properties:
    dlCarrierFreq:
      $ref: '#/components/schemas/ArfcnValueNR'
    cellIdList:
      type: array
      items:
        $ref: '#/components/schemas/PhysCellId'
      minItems: 1
      maxItems: 32
```

```
# 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

  OdbPacketServices:
    anyOf:
      - anyOf:
          - type: string
            enum:
              - ALL_PACKET_SERVICES
              - ROAMER_ACCESS_HPLMN_AP
              - ROAMER_ACCESS_VPLMN_AP
          - type: string
      - $ref: '#/components/schemas/NullValue'

#
# STRUCTURED DATA TYPES
#

  OdbData:
    type: object
    properties:
      roamingOdb:
        $ref: '#/components/schemas/RoamingOdb'

#
# Data Types related to Charging as defined in clause 5.8
#

#
# SIMPLE DATA TYPES
#
#

  ChargingId:
    $ref: '#/components/schemas/Uint32'

  ApplicationChargingId:
    type: string

  RatingGroup:
    $ref: '#/components/schemas/Uint32'

  ServiceId:
    $ref: '#/components/schemas/Uint32'

#
# Enumerations
#

#
# STRUCTURED DATA TYPES
#

  SecondaryRatUsageReport:
    type: object
    properties:
      secondaryRatType:
        $ref: '#/components/schemas/RatType'
      qosFlowsUsageData:
        type: array
        items:
          $ref: '#/components/schemas/QosFlowUsageReport'
        minItems: 1
    required:
      - secondaryRatType
      - qosFlowsUsageData

  QosFlowUsageReport:
    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:
  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:
  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

#
# 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: Payload 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'
'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   | Snsai pattern  | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0039 | 1   | F   | GroupId pattern  | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0059 |     | F   | Adding of HTTP status code "406 Not Acceptable"  | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0041 | 1   | F   | VarUeld definition   | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0061 |     | F   | ProblemDetails for 501   | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0063 |     | F   | Changeltem alignment   | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0046 | 2   | F   | Regular Expression Patterns  | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0048 | 3   | F   | Alignments with NGAP   | 15.2.0      |
| 2018-12        | CT#82   | CP-183168 | 0065 | 1   | F   | Secondary RAT usage data reporting   | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0060 | 1   | F   | Data types associated with Subscribed and Authorized Default QoS for Default QoS Flow          | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0042 | 3   | F   | Alignment of pattern for data types with "nullable" property                                   | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0062 | 1   | F   | NF Group Id  | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0053 | 2   | F   | data type for complex query expression   | 15.2.0      |
| 2018-12        | CT#82   | CP-183161 | 0064 | 2   | F   | NgRanIdentifier and PresenceInfo   | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0068 |     | F   | Addition of HTTP status code "412 Precondition Failed"   | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0051 | 3   | F   | Introduction of Barring of Roaming in 5GC  | 15.2.0      |
| 2018-12        | CT#82   | CP-183024 | 0066 | 1   | F   | Service Area Restriction   | 15.2.0      |

|         |       |           |      |   |   |   |        |
|---------|-------|-----------|------|---|---|---|--------|
| 2018-12 | CT#82 | CP-183024 | 0067 | 1 | F | Charging related types  | 15.2.0 |
| 2018-12 | CT#82 | CP-183024 | 0070 |   | F | Correction of the reference for the SupportedFeatures Data Type                               | 15.2.0 |
| 2018-12 | CT#82 | CP-183024 | 0072 | 1 | F | Update open API version   | 15.2.0 |
| 2018-12 | CT#82 | CP-183024 | 0073 |   | F | ExternalDoc update  | 15.2.0 |
| 2019-03 | CT#83 | CP-190029 | 0075 | 3 | F | Corrections on subscribed Priority  | 15.3.0 |
| 2019-03 | CT#83 | CP-190029 | 0076 | 1 | F | AmfRegionId and AmfSetId  | 15.3.0 |
| 2019-03 | CT#83 | CP-190029 | 0077 | 2 | F | Supported features  | 15.3.0 |
| 2019-03 | CT#83 | CP-190029 | 0078 | 2 | F | Corrections on n3iwf Id   | 15.3.0 |
| 2019-03 | CT#83 | CP-190029 | 0079 | 2 | F | Corrections on the encoding of bit string   | 15.3.0 |
| 2019-03 | CT#83 | CP-190029 | 0081 | 2 | F | Corrections on Type RouteToLocation   | 15.3.0 |
| 2019-03 | CT#83 | CP-190029 | 0082 | 1 | F | ODB correction  | 15.3.0 |
| 2019-03 | CT#83 | CP-190029 | 0083 |   | F | 3GPP TS 29.571 API version update   | 15.3.0 |
| 2019-06 | CT#84 | CP-191041 | 0077 | 3 | F | CR not implemented – Supported Features   | 15.4.0 |
| 2019-06 | CT#84 | CP-191041 | 0084 | 1 | F | Service Area Restriction  | 15.4.0 |
| 2019-06 | CT#84 | CP-191041 | 0087 | 1 | F | Changeltem Indicating Complete Resource Creation or Removal                                   | 15.4.0 |
| 2019-06 | CT#84 | CP-191041 | 0089 | 2 | F | Storage of OpenAPI specification files  | 15.4.0 |
| 2019-06 | CT#84 | CP-191041 | 0090 | 1 | F | Clarificaiton on Universal Matching Pattern Schema  | 15.4.0 |
| 2019-06 | CT#84 | CP-191041 | 0086 | 2 | F | Correct the discription of 5qi in SubscribedDefaultQos  | 15.4.0 |
| 2019-06 | CT#84 | CP-191041 | 0097 |   | F | AreaCode  | 15.4.0 |
| 2019-06 | CT#84 | CP-191041 | 0094 | 1 | F | Required attributes in NotifyItem   | 15.4.0 |
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| 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 |
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| 2019-09 | CT#85 | CP-192211 | 0105 | 2 | B | Common Data Type for 5G SRVCC   | 16.1.0 |
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| 2019-09 | CT#85 | CP-192120 | 0124 |   | F | 3GPP TS 29.571 API version update   | 16.1.0 |
| 2019-09 | CT#85 | CP-192210 | 0125 |   | F | Correction and alignment of Sampling Ratio  | 16.1.0 |
| 2019-12 | CT#86 | CP-193032 | 0130 |   | A | N3IWF ID encoding   | 16.2.0 |
| 2019-12 | CT#86 | CP-193032 | 0138 |   | A | Correction to GNBld   | 16.2.0 |
| 2019-12 | CT#86 | CP-193057 | 0126 | 1 | B | Format of NF (Service) Set ID   | 16.2.0 |
| 2019-12 | CT#86 | CP-193046 | 0142 | 1 | F | MAC Address as PEI format   | 16.2.0 |
| 2019-12 | CT#86 | CP-193050 | 0143 | 1 | F | Alternative 1 for global uniqueness of universally managed NID - simple data types correction | 16.2.0 |
| 2019-12 | CT#86 | CP-193046 | 0135 | 2 | B | Definition of TNAID   | 16.2.0 |
| 2019-12 | CT#86 | CP-193063 | 0131 | 1 | B | HAL-forms data type   | 16.2.0 |
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| 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 |
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| 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 |

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| 2019-12 | CT#86  | CP-193063 | 0145 | 1 | B | InvalidParam Data Type   | 16.2.0 |
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| 2020-03 | CT#87E | CP-200032 | 0168 | 1 | C | NID  | 16.3.0 |
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| 2020-06 | CT#88E | CP-201034 | 0210 | 1 | F | Nullvalue and "nullable" keyword   | 16.4.0 |
| 2020-06 | CT#88E | CP-201034 | 0222 | 1 | F | Editorial corrections  | 16.4.0 |
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| 2020-06 | CT#88E | CP-201048 | 0218 | 1 | F | Removal of RG-TMBR   | 16.4.0 |
| 2020-06 | CT#88E | CP-201048 | 0219 | 1 | F | Update the RAT type definition   | 16.4.0 |
| 2020-06 | CT#88E | CP-201048 | 0217 | 1 | F | Reference for RgWirelineCharacteristics  | 16.4.0 |
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| 2020-06 | CT#88E | CP-201066 | 0226 | 1 | F | Correcting wrong reference   | 16.4.0 |
| 2020-06 | CT#88E | CP-201073 | 0228 |   | F | API version and External doc update  | 16.4.0 |
| 2020-09 | CT#89E | CP-202107 | 0236 | 1 | F | Dynamic CN PDB   | 16.5.0 |
| 2020-09 | CT#89E | CP-202100 | 0232 | 1 | F | Error corrections  | 16.5.0 |
| 2020-09 | CT#89E | CP-202100 | 0234 | 1 | F | Additional PRA ID  | 16.5.0 |
| 2020-09 | CT#89E | CP-202103 | 0233 | 1 | F | N5GC Location  | 16.5.0 |
| 2020-09 | CT#89E | CP-202506 | 0231 | 1 | F | Ncgi typo correction   | 16.5.0 |

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| 2020-09 | CT#89E | CP-202109 | 0229 | 1 | F | Adding missing Reference to SUPI definition                              | 16.5.0  |
| 2020-09 | CT#89E | CP-202096 | 0237 |   | F | Rel-16 API version and External doc update                               | 16.5.0  |
| 2020-12 | CT#90E | CP-203035 | 0239 |   | F | Removal of the reference to ETSI forge                                   | 16.6.0  |
| 2020-12 | CT#90E | CP-203031 | 0240 |   | F | Correction for implementation error 29.571                               | 16.6.0  |
| 2020-12 | CT#90E | CP-203031 | 0243 |   | F | Incomplete references and wrong table header                             | 16.6.0  |
| 2020-12 | CT#90E | CP-203039 | 0245 |   | F | Alignment with TR-456 / TR-470 (BBF technical specifications)            | 16.6.0  |
| 2020-12 | CT#90E | CP-203048 | 0241 | 1 | F | ssid typo in yaml  | 16.6.0  |
| 2020-12 | CT#90E | CP-203031 | 0246 | 1 | F | MDT LTE Measurements   | 16.6.0  |
| 2020-12 | CT#90E | CP-203068 | 0247 | 2 | F | MDT Parameters for NR  | 16.6.0  |
| 2020-12 | CT#90E | CP-203036 | 0248 |   | F | Rel-16 API version and External doc update                               | 16.6.0  |
| 2021-03 | CT#91E | CP-210047 | 0263 |   | F | NF Set ID and NF Service Set ID Definition for SNPN                      | 16.7.0  |
| 2021-03 | CT#91E | CP-210037 | 0251 | 1 | F | Error handling when the SCP fails to obtain an access token              | 16.7.0  |
| 2021-03 | CT#91E | CP-210037 | 0255 | 1 | F | Corrections on MDT parameters  | 16.7.0  |
| 2021-03 | CT#91E | CP-210054 | 0261 |   | F | 29.571 Rel-16 API version and External doc update                        | 16.7.0  |
| 2021-06 | CT#92E | CP-211080 | 0266 |   | F | TAI in EutraLocation   | 16.8.0  |
| 2021-06 | CT#92E | CP-211059 | 0270 | 2 | F | RedirectResponse data type definition                                    | 16.8.0  |
| 2021-06 | CT#92E | CP-211060 | 0279 |   | F | Essential Correction to GeraLocation, LAC/RAC/SAC and Cell ID data types | 16.8.0  |
| 2021-06 | CT#92E | CP-211073 | 0286 |   | F | 29.571 Rel-16 API version and External doc update                        | 16.8.0  |
| 2021-09 | CT#93E | CP-212079 | 0294 | 2 | F | UE Transport Protocol Indication for N3GPP Location                      | 16.9.0  |
| 2021-09 | CT#93E | CP-212-69 | 0301 |   | F | Extension of userLocationInfo attribute to support GERAN/UTRAN access    | 16.9.0  |
| 2021-09 | CT#93E | CP-212080 | 0299 |   | F | 29.571 Rel-16 API version and External doc update                        | 16.9.0  |
| 2021-12 | CT#94E | CP-213112 | 0318 |   | F | SEPP Redirection   | 16.10.0 |
| 2021-12 | CT#94E | CP-213088 | 0322 |   | F | SnssaiExtension data type definition                                     | 16.10.0 |
| 2021-12 | CT#94E | CP-213146 | 0321 |   | F | 29.571 Rel-16 API version and External doc update                        | 16.10.0 |
| 2022-03 | CT#95E | CP-22067  | 0331 |   | F | Correction to wrong CR implementation                                    | 16.11.0 |
| 2022-03 | CT#95E | CP-22079  | 0341 |   | F | 29.571 Rel-16 API version and External doc update                        | 16.11.0 |
| 2022-06 | CT#96  | CP-221029 | 0360 |   | F | Incomplete CR implementation for RouteToLocation                         | 16.12.0 |
| 2022-06 | CT#96  | CP-221071 | 0363 | 3 | F | MNC Encoding in NfSetId and NfServiceSetId                               | 16.12.0 |
| 2022-09 | CT#97  | CP-222069 | 0374 |   | F | Missing Reference RFC 7542   | 16.13.0 |
| 2024-03 | CT#103 | CP-240072 | 0526 |   | F | Trace Data   | 16.14.0 |
| 2024-03 | CT#103 | CP-240072 | 0523 |   | F | Correction to UtraLocation and GeraLocation                              | 16.14.0 |
| 2024-03 | CT#103 | CP-240070 | 0536 |   | F | 29.571 Rel-16 API version and External doc update                        | 16.14.0 |

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# History

| <b>Document history</b> |                |             |
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| V16.4.0                 | July 2020      | Publication |
| V16.5.0                 | November 2020  | Publication |
| V16.6.0                 | January 2021   | Publication |
| V16.7.0                 | April 2021     | Publication |
| V16.8.0                 | August 2021    | Publication |
| V16.9.0                 | September 2021 | Publication |
| V16.10.0                | January 2022   | Publication |
| V16.11.0                | April 2022     | Publication |
| V16.12.0                | July 2022      | Publication |
| V16.13.0                | October 2022   | Publication |
| V16.14.0                | April 2024     | Publication |