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# Foreword

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

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

Version x.y.z

where:

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

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# 1 Scope

The present specification describes the protocol for the NEF Northbound interface between the NEF and the AF. The NEF Northbound interface and the related stage 2 functional requirements are defined in 3GPP TS 23.502 [2], 3GPP TS 23.316 [28] and 3GPP TS 23.288 [29].

---

# 2 References

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

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

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 23.502: "Procedures for the 5G system".
- [3] 3GPP TS 23.501: "System Architecture for the 5G".
- [4] 3GPP TS 29.122: "T8 reference point for northbound Application Programming Interfaces (APIs)".
- [5] Open API Initiative, "OpenAPI 3.0.0 Specification", <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.
- [6] 3GPP TS 33.501: "Security architecture and procedures for 5G System".
- [7] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".
- [8] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".
- [9] 3GPP TS 29.521: "5G System; Binding Support Management Service; Stage 3".
- [10] Void.
- [11] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs; Stage 2".
- [12] 3GPP TS 29.222: "Common API Framework for 3GPP Northbound APIs; Stage 3".
- [13] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".
- [14] 3GPP TS 33.122: "Security Aspects of Common API Framework for 3GPP Northbound APIs".
- [15] Void.
- [16] IETF RFC 5246: "The Transport Layer Security (TLS) Protocol Version 1.2".
- [17] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".
- [18] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".
- [19] 3GPP TS 29.554: "5G System; Background Data Transfer Policy Control Service; Stage 3".
- [20] 3GPP TS 29.504: "5G System; Unified Data Repository Services; Stage 3".
- [21] 3GPP TR 21.900: "Technical Specification Group working methods".

- [22] 3GPP TS 29.523: "5G System; Policy Control Event Exposure Service; Stage 3".
- [23] 3GPP TS 29.519: "5G System; Usage of the Unified Data Repository service for Policy Control Data, Application Data and Structured Data for Exposure; Stage 3".
- [24] 3GPP TS 29.541: "5G System; Network Exposure (NE) function services for Non-IP Data Delivery (NIDD); Stage 3".
- [25] 3GPP TS 29.542: "5G System, Session management services for Non-IP Data Delivery (NIDD); Stage 3".
- [26] 3GPP TS 29.508: "5G System; Session Management Event Exposure Service; Stage 3".
- [27] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".
- [28] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G system (5GS)".
- [29] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".
- [30] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".
- [31] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to Vehicle-to-Everything (V2X) services".
- [32] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".
- [33] 3GPP TS 24.588: "Vehicle-to-Everything (V2X) services in 5G System (5GS); User Equipment (UE) policies; Stage 3".
- [34] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3".
- [35] 3GPP TS 29.515: "5G System; Gateway Mobile Location Services; Stage 3".
- [36] 3GPP TS 23.273: "5G System Location Services (LCS)".

---

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP 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].

|       |  |
|-------|--|
| ACS   | Auto-Configuration Server              |
| AF    | Application Function                   |
| BDT   | Background Data Transfer               |
| CAPIF | Common API Framework                   |
| CP    | Communication Pattern                  |
| DN    | Data Network                           |
| DNAI  | DN Access Identifier                   |
| DNN   | Data Network Name                      |
| GMLC  | Global Mobile Location Centre          |
| GPSI  | Generic Public Subscription Identifier |
| IPTV  | Internet Protocol Television           |

|         |   |
|---------|---|
| MO-LR   | Mobile Originated Location Request                    |
| NEF     | Network Exposure Function                             |
| PCF     | Policy Control Function                               |
| PCRF    | Policy and Charging Rule Function                     |
| PFD     | Packet Flow Description                               |
| PFDF    | Packet Flow Description Function                      |
| REST    | Representational State Transfer                       |
| SCEF    | Service Capability Exposure Function                  |
| S-NSSAI | Single Network Slice Selection Assistance Information |
| UDR     | Unified Data Repository                               |
| UP      | User Plane  |
| WB      | Wide Band   |

---

## 4 NEF Northbound Interface

### 4.1 Overview

The NEF Northbound interface is between the NEF and the AF. It specifies RESTful APIs that allow the AF to access the services and capabilities provided by 3GPP network entities and securely exposed by the NEF.

This document also specifies the procedures triggered at the NEF by API requests from the AF and by event notifications received from 3GPP network entities.

The stage 2 level requirements and signalling flows for the NEF Northbound interface are defined in 3GPP TS 23.502 [2].

The NEF Northbound interface supports the following procedures:

- 1) Procedures for Monitoring
- 2) Procedures for Device Triggering
- 3) Procedures for resource management of Background Data Transfer
- 4) Procedures for CP Parameters, Network Configuration Parameters Provisioning, 5G LAN Parameters Provisioning, ACS Configuration Parameter Provisioning and Location Privacy Indication Parameters Provisioning
- 5) Procedures for PFD Management
- 6) Procedures for Traffic Influence
- 7) Procedures for changing the chargeable party at session set up or during the session
- 8) Procedures for setting up an AF session with required QoS
- 9) Procedures for MSISDN-less Mobile Originated SMS
- 10) Procedures for non-IP data delivery
- 11) Procedures for analytics information exposure
- 12) Procedure for applying BDT policy
- 13) Procedures for Enhanced Coverage Restriction Control
- 14) Procedures for IPTV Configuration
- 15) Procedures for Service Parameter Provisioning
- 16) Procedures for RACS Parameter Provisioning
- 17) Procedures for Mobile Originated Location Request

Which correspond to the following services respectively, supported by the NEF as defined in 3GPP TS 23.502 [2]:

- 1) Nnef\_EventExposure service and Nnef\_APISupportCapability service
- 2) Nnef\_Trigger service
- 3) Nnef\_BDTPNegotiation service
- 4) Nnef\_ParameterProvision service
- 5) Nnef\_PFDManagement service
- 6) Nnef\_TrafficInfluence service
- 7) Nnef\_ChargeableParty service
- 8) Nnef\_AFsessionWithQoS service
- 9) Nnef\_MSISDN-less\_MO\_SMS service
- 10) Nnef\_NIDDConfiguration and Nnef\_NIDD services
- 11) Nnef\_AnalyticsExposure service
- 12) Nnef\_ApplyPolicy service
- 13) Nnef\_ECRestriction service
- 14) Nnef\_IPTVConfiguration service
- 15) Nnef\_ServiceParameter service
- 16) Nnef\_UCMFProvisioning service
- 17) Nnef\_Location service

NOTE 1: For Nnef\_PFDManagement service, only the Nnef\_PFDManagement\_Create/Update/Delete service operations are applicable for the NEF Northbound interface.

NOTE 2: For Nnef\_NIDD service, NF consumer other than the AF does not use the NEF Northbound interface.

NOTE 3: For Nnef\_NIDDConfiguration service, the Nnef\_NIDDConfiguration\_Trigger service operation is only applicable for the NEF Northbound interface.

NOTE 4: The Nnef\_APISupportCapability service is only applicable in the MonitoringEvent API when the monitoring type sets to "API\_SUPPORT\_CAPABILITY".

## 4.2 Reference model

The NEF Northbound interface resides between the NEF and the AF as depicted in figure 4.2.1. The overall NEF architecture is depicted in 3GPP TS 23.502 [2]. An AF can get services from multiple NEFs, and an NEF can provide services to multiple AFs.

NOTE: The AF can be provided by a third party.

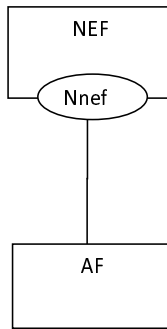


Figure 4.2-1: Reference Architecture for the Nnef Service; SBI representation

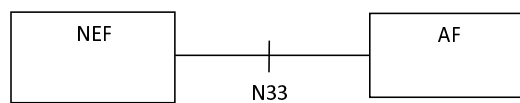


Figure 4.2-2: Reference Architecture for the Nnef Service; reference point representation

## 4.3 Functional elements

### 4.3.1 NEF

The Network Exposure Function (NEF) is a functional element that supports the following functionalities:

- The NEF shall securely expose network capabilities and events provided by 3GPP NFs to AF.
- The NEF shall provide means for the AF to securely provide information to 3GPP network and may authenticate, authorize and assist in throttling the AF.
- The NEF shall be able to translate the information received from the AF to the one sent to internal 3GPP NFs, and vice versa.
- The NEF shall support to expose information (collected from other 3GPP NFs) to the AF.
- The NEF may support a PFD Function which allows the AF to provision PFD(s) and may store and retrieve PFD(s) in the UDR. The NEF further provisions PFD(s) to the SMF.

A specific NEF instance may support one or more of the functionalities described above and consequently an individual NEF may support a subset of the APIs specified for capability exposure.

NOTE: The NEF can access the UDR located in the same PLMN as the NEF.

### 4.3.2 AF

The Application Function (AF) may interact with the 3GPP Core Network via the NEF in order to access network capabilities.



## 4.4 Procedures over NEF Northbound Interface

### 4.4.1 Introduction

All procedures that operate across the NEF Northbound interface, as specified in 3GPP TS 23.502 [2], are specified in the following subclauses.

### 4.4.2 Procedures for Monitoring

The procedures for monitoring as described in subclause 4.4.2 of 3GPP TS 29.122 [4] shall be applicable in 5GS with the following differences:

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- description of the HSS applies to the UDM, and the NEF shall interact with the UDM by using Nudm\_EventExposure service as defined in 3GPP TS 29.503 [17];
- description of the MME/SGSN applies to the AMF, the NEF shall resolve a location area to the involved AMF(s) either by local configuration or via the NRF, and the NEF shall interact with the AMF by using Namf\_EventExposure service as defined in 3GPP TS 29.518 [18];
- description about the PCRF is not applicable;
- description about the change of IMSI-IMEI(SV) association monitoring event applies to the change of SUPI-PEI association monitoring event;
- when "monitoringType" sets to "LOCATION\_REPORTING" within the MonitoringEventSubscription data type as defined in subclause 5.3.2.1.2 of 3GPP TS 29.122 [4] during the monitoring event subscription, only "CGI\_ECGI", "TA\_RA" and "GEO\_AREA" within the Accuracy data type as defined in subclause 5.3.2.4.7 of 3GPP TS 29.122 [4], are applicable for 5G MonitoringEvent API.
- after validation of the AF request, the NEF may determine a monitoring expiry time, based on operator policy and take into account the monitoring expire time if included in the request; and the NEF may provide a expiry time (determined by the NEF, UDM or AMF) to the AF even the AF does not provided before.
- if the "Loss\_of\_connectivity\_notification" as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, values 0-5 are not applicable for the lossOfConnectReason attribute within MonitoringEventReport data type, the lossOfConnectReason attribute shall be set to 6 if the UE is deregistered, 7 if the maximum detection timer expires or 8 if the UE is purged.
- the AF may include a periodic reporting time indicated by the "repPeriod" attribute within MonitoringEventSubscription data type, which is only applicable for the "Location\_notification" feature in the NEF.
- if the "locationType" attribute sets to "LAST\_KNOWN\_LOCATION", the "maximumNumberOfReports" attribute shall set to 1 as a One-time Monitoring Request.
- the default value of "accuracy" attribute within the MonitoringEventSubscription data type is "TA\_RA".
- description about the PDN connectivity status event applies to the PDU session status event, the description of the MME/SGSN applies to the SMF during the reporting of monitoring event procedure, the NEF receives the event notification via Nsmf\_EventExposure service as defined in 3GPP TS 29.508 [26];
- when sending the UDM/AMF/SMF event report to the AF, the NEF may store the event data in the report in the UDR as part of the data for exposure as specified in 3GPP TS 29.519 [23] by using Nudr\_DataRepository service as specified in 3GPP TS 29.504 [20].
- If the "Downlink\_data\_delivery\_status\_5G" as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support the downlink data delivery status notification,
  - the AF shall send an HTTP POST message to the NEF to the resource "Monitoring Event Subscriptions" as defined in subclause 5.3.3.2 of 3GPP TS 29.122 [4] for creating an subscription or send an HTTP PUT

message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in subclause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription with the following difference:

- within the MonitoringEventSubscription data structure the AF may additionally include packet filter descriptor(s) within the "dddTraDescriptors" attribute and the list of monitoring downlink data delivery status event(s) within the "dddStati" attribute;
- the NEF shall subscribe the events to the appropriate UDM(s) within the network by invoking the Nudm\_EventExposure\_Subscribe service operation as defined in subclause 5.5.2.2 of 3GPP TS 29.503 [17].
- when the NEF receives the event notification as defined in subclause 4.4.2 of 3GPP TS 29.508 [26], the NEF shall send an HTTP POST message to the AF as defined in subclause 4.4.2.3 of 3GPP TS 29.122 [4] with the difference that within each MonitoringEventReport data structure, the NEF shall include:
  - the downlink data delivery status within the "dddStatus" attribute;
  - the downlink data descriptor impacted by the downlink data delivery status change within the "dddTraDescriptor" attribute;
  - the estimated buffering time within the "maxWaitTime" attribute if the downlink data delivery status is set to "BUFFERED";
  - If the "Availability\_after\_DDN\_failure\_notification\_enhancement" feature as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, the AF shall send an HTTP POST message to the NEF to the resource "Monitoring Event Subscriptions" as defined in subclause 5.3.3.2 of 3GPP TS 29.122 [4] for creating an subscription or send an HTTP PUT message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in subclause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription with the difference that within the MonitoringEventSubscription data structure, the AF shall include packet filter descriptions within the "dddTraDescriptors" attribute.
- If the "eLCS" feature as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, the AF may send an HTTP POST message to the NEF to the resource "Monitoring Event Subscriptions" as defined in subclause 5.3.3.2 of 3GPP TS 29.122 [4] for creating an subscription or send an HTTP PUT message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in subclause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription with the following difference:
  - within the MonitoringEventSubscription data structure, the AF may additionally include location QoS requirement within the "locQoS" attribute, the service identifier within the "svcId" attribute, Location deferred requested event type within the "ldrType" attribute, the validity start time and the validity end time within the "locTimeWindow" attribute, the maximum age of location estimate within the "maxAgeOfLocEst" attribute, the requesting target UE velocity within the "velocityRequested" attribute, the linear distance within the "linearDistance" attribute, the reporting target UE location estimate indication within the "reportingLocEstInd" attribute, the sampling interval within the "samplingInterval" attribute, the maximum reporting expire interval within the "maxRptExpireIntvl" attribute, the supported GAD shapes within the "supportedGADShapes" attribute, the Code word within the "codeword" attribute, and other attributes as defined in subclause 5.3.2.3.2 of 3GPP TS 29.122 [4] for location information subscription; The MonitoringEventSubscription data structure may also include the "locationArea5G" attribute containing only the "geographicAreas" attribute and the "accuracy" attribute set to the value "GEO\_AREA".
  - if the NEF identifies the location request precision higher than cell level location accuracy is required based on the "locQoS" attribute received, the NEF shall interact with the appropriate GMLC within the network by invoking the Ngmlc\_Location\_ProvideLocation service operation as defined in subclause 6.1 of 3GPP TS 29.515 [35];
  - if the location request precision is lower than or equal to cell level, based on implementation, the NEF may interact with the GMLC by invoking the Ngmlc\_Location\_ProvideLocation service operation as defined in subclause 6.1 of 3GPP TS 29.515 [35]; or retrieve the UE location privacy information from the UDM by using Nudm\_SDM service as described in subclause 5.2 of 3GPP TS 29.503 [17] and if the privacy setting is verified, the NEF shall interact with the UDM for the serving AMF address by invoking the Nudm\_UECM service as described in subclause 5.3 of 3GPP TS 29.503 [17]. After receiving the serving AMF address from the UDM, the NEF shall interact with the AMF by invoking the Namf\_EventExposure\_Subscribe service operation as defined in subclause 5.3 of 3GPP TS 29.518 [18];

or may interact with UDM by using Nudm\_EventExposure service as defined in subclause 5.5 of 3GPP TS 29.503 [17] and the NEF receives the location event notification from the AMF via Namf\_EventExposure service as defined in in subclause 5.5 of 3GPP TS 29.518 [18].

- Based on the received AF information and local authorization policy, the NEF shall derive the LCS client type with a suitable enumeration value for the AF location request, to be provided as the "externalClientType" attribute when invoking the Ngmlc\_Location\_ProvideLocation service operation as defined in subclause 6.1 of 3GPP TS 29.515 [35].

Upon receipt of a successful location response from the GMLC or the AMF or the UDM, the NEF shall create or update the "Individual Monitoring Event Subscription" resource and then send an HTTP POST or PUT response to the AF as defined in subclause 4.4.2.2 of 3GPP TS 29.122 [4]. Upon receipt of the location Report from the GMLC or the AMF, the NEF shall determine the monitoring event subscription associated with the corresponding Monitoring Event Report as defined in subclause 4.4.2.3 of 3GPP TS 29.122 [4].

In order to delete a previous active configured monitoring event subscription at the NEF, the AF shall send an HTTP DELETE message to the NEF to the resource "Individual Monitoring Event Subscription" which is received in the response to the request that has created the monitoring events subscription resource. The NEF shall interact with the GMLC or the AMF or the UDM to remove the request, upon receipt of the successful response from the GMLC or the AMF or the UDM, the NEF shall delete the active resource "Individual Monitoring Event Subscription" addressed by the URI and send an HTTP response to the AF with a "204 No Content" status code, or a "200 OK" status code including the monitoring event report if received.

### 4.4.3 Procedures for Device Triggering

The procedures for device triggering as described in subclause 4.4.6 of 3GPP TS 29.122 [4] shall be applicable in 5G with the following differences:

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- description of the HSS applies to the UDM;
- the NEF shall interact with the UDM by using the Nudm\_SubscriberDataManagement service and the Nudm\_UEContextManagement service as defined in 3GPP TS 29.503 [17]; and
- the NEF acts as MTC-IWF.

### 4.4.4 Procedures for resource management of Background Data Transfer

The procedures for resource management of Background Data Transfer (BDT) in 5GS are described in subclause 4.4.3 of 3GPP TS 29.122 [4] with the following differences:

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- If the feature Group\_Id is supported, an external group identifier may be included in the HTTP POST or PUT request message by the NEF. If the external group Id is sent from the AF to the NEF, the NEF shall interact with the UDM by using Nudm\_SubscriberDataManagement service as defined in 3GPP TS 29.503 [17] to translate the external group identifier into the corresponding internal group identifier;
- description of the PCRF applies to the PCF;
- the NEF shall interact with the PCF by using Npcf\_BDTPolicyControl service as defined in 3GPP TS 29.554 [19];
- if the "BdtNotification\_5G" feature is supported, the AF may include a notification URI within the "notificationDestination" attribute in the Bdt data type during the background data transfer policy negotiation. In addition, the AF may request to enable the BDT warning notification by setting the "warnNotifEnabled" attribute to true. When the NEF receives the BDT warning notification from the PCF as defined in clause 4.2.4.2 of 3GPP TS 29.554 [19] and the "warnNotifEnabled" attribute was set to true, the NEF shall send an HTTP POST message including the ExNotification data structure to the AF identified by the notification destination URI

received during the background data transfer policy negotiation. The AF shall respond with an HTTP response to confirm the received notification. The AF may select one policy from the candidate of BDT policies if provided in the notification by using the HTTP PATCH message as described in subclause 5.4.3.3.3 of 3GPP TS 29.122 [4]. The AF may also request to disable/enable the BDT warning notification by including the "warnNotifEnabled" attribute in the HTTP PATCH message; and

- The AF may include a traffic descriptor of background data within the "trafficDes" attribute in the Bdt data type during the background data transfer policy negotiation.

#### 4.4.5 Procedures for CP Parameters Provisioning

The procedures for CP parameters provisioning as described in subclause 4.4.9 of 3GPP TS 29.122 [4] shall be applicable in 5G with the following differences:

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- description of the HSS applies to the UDM;
- the NEF shall interact with the UDM by using Nudm\_ParameterProvision service as defined in 3GPP TS 29.503 [17]; and
- if the ExpectedUMT\_5G feature as defined in subclause 5.10.4 of 3GPP TS 29.122 [4] is supported, the expected UE moving trajectory within the "expectedUmts" attribute shall also be included in the HTTP POST/PUT request. In addition, if the ExpectedUmtTime\_5G feature as defined in subclause 5.10.4 of 3GPP TS 29.122 [4] is supported, the start time and duration may be provided in the "expectedUmts" attribute to indicate when the UE arrives at a location and how long the UE stays in the location and the periodicity in the "expectedUmtDays" attribute may be provided to indicate the effective days within a week.

#### 4.4.6 Procedures for PFD Management

The procedures for PFD management as described in subclause 4.4.10 of 3GPP TS 29.122 [4] shall be applicable for 5GS with the following differences:

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF; and
- the NEF (PFDF) shall interact with the UDR for PFD management by using Nudr\_DataRepository service as defined in 3GPP TS 29.504 [20]. The PFDF is functionality within the NEF.
- If the PFDs are provisioned to at least one of the subscribed SMFs (but not all) within the allowed delay, the NEF (PFDF) may notify the AF about the failed PFD provisioning with the HTTP POST message by including the PfdReport data structure in the body of the message. In addition, the NEF may include the location area(s) of the user plane(s) which are unable to enforce the provisioned PFD(s) within the "locationArea" attribute of the PFD report(s). If the PFDs are provisioned to none of the subscribed SMFs within the allowed delay, the NEF (PFDF) shall notify the AF about the failed PFD provisioning with the HTTP POST message using appropriate failure code as defined in Table 5.11.2.2.3-1 of 3GPP TS 29.122 [4].

NOTE 1: Unsuccessful PFDs provisioning to the subscribed SMFs within the allowed delay means that the PFDs are not provisioned successfully to the UPFs served by the failed SMFs.

NOTE 2: The NEF maps the 3GPP network area(s) to the geographic area(s), civic address(es) or DNAI(s) if the 3GPP network area(s) is not allowed to be exposed to the 3rd party according to the operator policy.

#### 4.4.7 Procedures for Traffic Influence

##### 4.4.7.1 General

In order to create a resource for the Traffic Influence, the AF shall send an HTTP POST message to the NEF to the resource "Traffic Influence Subscription", the body of the HTTP POST message may include the AF Service Identifier,

external Group Identifier, any UE Indication, the UE address, GPSI, DNN, S-NSSAI, Application Identifier or traffic filtering information, Subscribed Event, Notification destination address, a list of geographic zone identifier(s), AF Transaction Identifier, a list of DNAI(s), routing profile ID(s) or N6 traffic routing information, Indication of application relocation possibility, type of notifications, Temporal validity conditions, and if the URLLC feature is supported, Indication of AF acknowledgement to be expected and/or Indication of UE IP address preservation. The Notification destination address shall be included if the Subscribed Event is included in the HTTP request message.

In order to update an existing traffic influence subscription, the AF shall send an HTTP PUT or PATCH message to the resource "Individual Traffic Influence Subscription" requesting to change the traffic influence parameters.

In order to delete an existing traffic influence subscription, the AF shall send an HTTP DELETE message to the NEF to the resource "Individual Traffic Influence Subscription".

Upon receipt of the HTTP request from the AF, if the AF is authorized, the NEF shall perform the mapping as described in 3GPP TS 23.501 [3], and then perform as described in subclause 4.4.7.2 if the request is identified by UE address or perform as described in subclause 4.4.7.3 if the request is not identified by UE address.

#### 4.4.7.2 AF request identified by UE address

Upon receipt of the above AF request which is for an individual UE identified by IP or Ethernet address, the NEF may interact with the BSF to retrieve the related PCF information by invoking the `Nbsf_Management_Discovery` service operation as described in 3GPP TS 29.521 [9], if the NEF receives an error code from the BSF, the NEF shall not create, update or delete the resource and shall respond to the AF with a proper error status code.

After receiving a successful response from the BSF, the NEF shall interact with the PCF by invoking the `Npcf_PolicyAuthorization` service as described in 3GPP TS 29.514 [7]. After receiving a successful response from the PCF, the NEF shall,

- for the HTTP POST request, create a resource "Individual Traffic Influence Subscription" which represents the traffic influence subscription, addressed by a URI that contains the AF Identifier and an NEF-created subscription identifier, and shall respond to the AF with a 201 Created status code, including a Location header field containing the URI for the created resource. The AF shall use the URI received in the Location header in subsequent requests to the NEF to refer to this traffic influence subscription.
- for the HTTP PUT or PATCH request, update a resource "Individual Traffic Influence Subscription" which represents the traffic influence subscription, and shall responds to the AF with a 200 OK status code.
- for the HTTP DELETE request, remove all properties of the resource and delete the corresponding active resource "Individual Traffic Influence Subscription" which represents the traffic influence subscription, then shall responds to the AF with a 204 No Content status code.

If the NEF receives a response with an error code from the PCF, the NEF shall not create, update or delete the resource and shall respond to the AF with a proper error status code.

#### 4.4.7.3 AF request not identified by UE address

For AF request not identified by UE address, it may target an individual UE, a group of UEs or any UE. For an individual UE identified by GPSI, or a group of UEs identified by External Group Identifier, the NEF shall interact with the UDM by invoking the `Nudm_SubscriberDataManagement` service as described in 3GPP TS 29.503 [17] to retrieve the SUPI or Internal Group Identifier.

The NEF shall interact with the UDR by invoking the `Nudr_DataRepository` service as described in 3GPP TS 29.504 [20], if the NEF receives an error code from the UDR, the NEF shall not create, update or delete the resource and shall respond to the AF with a proper error status code.

After receiving a successful response from the UDR, the NEF shall,

- for the HTTP POST request, create a resource "Individual Traffic Influence Subscription" which represents the traffic influence subscription, addressed by a URI that contains the AF Identifier and an NEF-created subscription identifier, and shall respond to the AF with a 201 Created status code, including a Location header field containing the URI for the created resource. The AF shall use the URI received in the Location header in subsequent requests to the NEF to refer to this traffic influence subscription.

- for the HTTP PUT or PATCH request, update a resource "Individual Traffic Influence Subscription" which represents the traffic influence subscription, and shall respond to the AF with a 200 OK status code.
- for the HTTP DELETE request, delete the corresponding active resource "Individual Traffic Influence Subscription" which represents the traffic influence subscription, and shall respond to the AF with a 204 No Content status code.

#### 4.4.7.4 Handling of UP path management event notification

If the NEF receives a UP path management event notification from the SMF indicating that the subscribed event has been detected, then the NEF shall provide a notification by sending an HTTP POST message that shall include the EventNotification data type at least with the subscribed event (e.g. UP Path has changed) to the AF identified by the notification destination received during creation or modification of the Individual Traffic Influence Subscription. If a URI for AF acknowledgement within the "ackUri" attribute is provided by the SMF in the event notification as defined in 3GPP TS 29.508 [26], the NEF shall also provide a URI for AF acknowledgement within the "afAckUri" attribute in the EventNotification data.

Upon receipt of the event notification, the AF shall respond with a "204 No Content" status code to confirm the received event notification.

Afterwards, if a URI for AF acknowledgement within the "afAckUri" attribute is received during the UP path management event notification, the AF may determine that an application layer relocation is needed, and may then send an HTTP POST request as acknowledgement for the UP path management event notification to inform the NEF about the result of application layer relocation. If the application layer is ready and/or the application relocation is completed, within the payload of the HTTP POST request, the AF shall include the AfAckInfo data type with the "afStatus" attribute sets to "SUCCESS" and may provide the N6 traffic routing information associated to the target DNAI as a "trafficRoute" attribute within the AfResultInfo data; otherwise, the AF shall indicate the failure by including the AfAckInfo data type in the payload with the "afStatus" attribute sets to the corresponding failure cause. The NEF Northbound interface transaction identifier generated by the AF shall also be provided as the "afTransId" attribute within the AfAckInfo data if the AF has previously provided it.

Upon receipt of the AF acknowledgement, the NEF shall respond with a "204 No Content" status code to confirm the received acknowledgement, and forward the AF acknowledgement to the SMF as described in 3GPP TS 29.508 [26].

#### 4.4.8 Procedures for changing the chargeable party at session set up or during the session

The procedures for changing the chargeable party at session set up or during the session in 5GS are described in subclause 4.4.4 of 3GPP TS 29.122 [4] with the following differences:

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- description of the PCRF applies to the PCF;
- if the EthChgParty\_5G feature as defined in subclause 5.5.4 of 3GPP TS 29.122 [4] is supported and the request is for Ethernet UE:
  - in the HTTP POST request, the AF shall include the UE MAC address within the "macAddr" attribute instead of the UE IP address and the Ethernet Flow description within the "ethFlowInfo" attribute instead of the IP Flow description;
  - in the HTTP PATCH request, the AF may update the Ethernet Flow description within the "ethFlowInfo" attribute;
- the NEF may interact with BSF by using Nbsf\_Management\_Discovery service (as defined in 3GPP TS 29.521 [9]) to retrieve the PCF address; and
- the NEF shall interact with the PCF by using Npcf\_PolicyAuthorization service as defined in 3GPP TS 29.514 [7].

#### 4.4.9 Procedures for setting up an AF session with required QoS

The procedures for setting up an AF session with required QoS in 5GS are described in subclause 4.4.13 of 3GPP TS 29.122 [4] with the following differences:

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- description of the PCRF applies to the PCF;
- the NEF may interact with BSF by using Nbsf\_Management\_Discovery service as defined in 3GPP TS 29.521 [9] to retrieve the PCF address;
- the NEF shall interact with the PCF by using Npcf\_PolicyAuthorization service as defined in 3GPP TS 29.514 [7];
- description about the INDICATION\_OF\_SUCCESSFUL\_RESOURCES\_ALLOCATION event and INDICATION\_OF\_FAILED\_RESOURCES\_ALLOCATION event apply to the SUCCESSFUL\_RESOURCES\_ALLOCATION event and FAILED\_RESOURCES\_ALLOCATION event respectively.
- if the EthAsSessionQoS\_5G feature as defined in subclause 5.14.4 of 3GPP TS 29.122 [4] is supported and the request is for Ethernet UE:
  - in the HTTP POST/PUT request, the AF shall include the UE MAC address within the "macAddr" attribute instead of the UE IP address and the Ethernet Flow description within the "ethFlowInfo" attribute instead of the IP Flow description;
  - in the HTTP PATCH request, the AF may update the Ethernet Flow description within the "ethFlowInfo" attribute;
- if the "QoSMonitoring\_5G" feature as defined in subclause 5.14.4 of 3GPP TS 29.122 [4] is supported, in order to support the QoS Monitoring, the AF shall include "qosMonInfo" attribute. Within the QosMonitoringInformation data structure, the AF shall include:
  - one or more requested QoS Monitoring Parameter(s) within the "reqQosMonParams"; and
  - one or more report frequency within the "repFreqs" attribute; and
  - when the "repFreqs" attribute includes the value "PERIODIC", the reporting period within the "repPeriod" attribute; and
  - when the "repFreqs" attribute includes the value "EVENT\_TRIGGERED", the AF shall include:
    - the delay threshold for downlink with the "repThreshDl" attribute;
    - the delay threshold for uplink with the "repThreshUl" attribute; and/or
    - the delay threshold for round trip with the "repThreshRp" attribute; and
    - the minimum waiting time between subsequent reports within the "waitTime" attribute.
  - when the NEF receives the event notification as defined in subclause 4.2.2 of 3GPP TS 29.508 [26] or subclauses 4.2.4.12 and 4.2.5.14 of 3GPP TS 29.514 [7], the NEF shall include one or more QoS monitoring reports within the "qosMonReports" attribute. Within the QosMonitoringReport data structure, the NEF shall include:
    - the uplink packet delays within the "ulDelays" attribute; and/or
    - the downlink packet delays within the "dlDelays" attribute; and/or
    - the round trip packet delays within the "rtDelays" attribute; and

NOTE 1: The PCF or the SMF report one UL, DL and/or round-trip packet delay measurement for each periodic and/or event-triggered report as described in 3GPP TS 29.514 [7] and 3GPP TS 29.508 [26], i.e, the NEF can include only one element within the "ulDelays", "dlDelays", and/or "rtDelays" array(s), each one with the received report from the PCF or the SMF for the UL, DL and/or round-trip delay(s).

- if the "AlternativeQoS\_5G" feature is supported, the AF may include an ordered list of QoS references within the "altQoSReferences" attribute and, if the "DisableUENotification\_5G" feature is also supported, an indication that the UE does not need to be informed about changes related to Alternative QoS Profiles within the "disUeNotif" attribute. The NEF shall transfer them to the PCF in the Npcf\_PolicyAuthorization service and subscribe to PCF event "QOS\_NOTIF" in the Npcf\_PolicyAuthorization service. When the NEF receives the notification of PCF event "QOS\_NOTIF", it shall notify the AF with "QOS\_GUARANTEED" event; or "QOS\_NOT\_GUARANTEED" event with the currently applied QoS reference if received. When the NEF receives the notification of PCF event "SUCCESSFUL\_RESOURCES\_ALLOCATION", it shall notify the AF the event together with the currently applied QoS reference if received.

NOTE 2: Based on the operator configuration, the QoS reference identifiers received from the AF can be the same or different as the QoS reference identifiers known at the PCF. The NEF can perform a mapping for the QoS reference identifier.

#### 4.4.10 Procedures for MSISDN-less Mobile Originated SMS

The procedures are used by the NEF to send the MSISDN-less MO-SMS to the AF in 5GS are described in subclause 4.4.14 of 3GPP TS 29.122 [4] with the following differences:

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF; and
- the NEF shall interact with UDM by using Nudm\_SubscriberDataManagement service (as defined in 3GPP TS 29.503 [17]) to retrieve the external identifier.

#### 4.4.11 Procedures for Network Configuration Parameters Provisioning

The procedures for network configuration parameters provisioning as described in subclause 4.4.12 of 3GPP TS 29.122 [4] shall be applicable in 5GS with the following differences:

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- description of the HSS applies to the UDM; and
- the NEF shall interact with the UDM by using Nudm\_ParameterProvision service as specified in 3GPP TS 29.503 [17].

#### 4.4.12 Procedures for Non-IP data delivery

##### 4.4.12.1 General

The procedures are used by the NEF to send/receive the non-IP data to/from the AF. It comprises NIDD configuration and NIDD delivery.

The NIDD configuration may be triggered by the NEF or the AF. If it is triggered by the NEF, the NiddConfigurationTrigger API described in subclause 5.5 is used and the procedure is described in subclause 4.4.12.2.

##### 4.4.12.2 NIDD configuration Triggered by the NEF

If the NEF receives a NIDD connection establishment request from the SMF and if there is no NIDD configuration for the UE, the NEF may send a NIDD configuration trigger to the AF. The NEF determines the destination URI by local configuration. The NEF shall send to the determined destination URL an HTTP POST request that shall include a NiddConfigurationTrigger data type with:



- the NEF identifier,
- the AF identifier, and
- GPSI as UE identity.

The AF shall acknowledge the HTTP POST request with an HTTP 200 OK response. Then the AF may start NIDD configuration procedure as described in subclause 4.4.12.3.

#### 4.4.12.3 NIDD configuration triggered by the AF and NIDD delivery

The procedures for NIDD configuration triggered by the AF and NIDD delivery are described in subclause 4.4.5 of 3GPP TS 29.122 [4] with the following differences:

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- description of the MME/SGSN applies to the SMF;
- for the connection establishment, the interaction between the NEF and the SMF shall use Nnef\_SMContext service as specified in 3GPP TS 29.541 [24];
- for MO NIDD, the interaction between the SMF and the NEF shall use Nnef\_SMContext service as specified in 3GPP TS 29.541 [24]; and
- for MT NIDD, the interaction between the SMF and the NEF shall use Nsmf\_NIDD service as specified in 3GPP TS 29.542 [25].

#### 4.4.13 Procedures for RACS Parameter Provisioning

The procedures for RACS parameter provisioning as described in subclause 4.4.15 of 3GPP TS 29.122 [4] shall be applicable in 5G with the following differences:

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF.

#### 4.4.14 Procedures for analytics information exposure

##### 4.4.14.1 Subscription/unsubscription to notification of analytics information

The procedures are used by the AF to subscribe/unsubscribe to retrieve analytics information via NEF, and are used by the NEF to notify the AF about the requested analytics information as described in 3GPP TS 23.288 [29].

In order to subscribe to retrieve analytics information, the AF shall send an HTTP POST message to the NEF to the resource "Analytics Exposure Subscriptions", the HTTP POST message shall include AnalyticsExposureSubsc data structure as request body.

The AnalyticsExposureSubsc data structure shall include:

- an URI where to receive the requested notifications as "notifUri" attribute;
- Notification Correlation Identifier assigned by the NF service consumer for the requested notifications as "notifId" attribute; and
- a description of the subscribed events as "analyEventsSubs" attribute that for each event shall include
  - 1) an event identifier as "analyEvent" attribute.

The AnalyticsExposureSubsc data structure may include:

- event reporting requirement information as "analyRepInfo" attribute, which applies for all events in a subscription and may contain the following attributes:

- 1) event notification method (periodic, one time, on event detection) as "notifMethod" attribute;
- 2) maximum Number of Reports as "maxReportNbr" attribute;
- 3) monitoring Duration as "monDur" attribute;
- 4) repetition period for periodic reporting as "repPeriod" attribute;
- 5) immediate reporting indication as "immRep" attribute;
- 6) sampling ratio as "sampRatio" attribute;
- 7) group reporting guard time as "grpRepTime" attribute.

Each AnalyticsEventSubsc data structure may include:

- event specific filters via the "analyEventFilter" attribute; and
- the indication of the UEs to which the subscription applies via "tgtUe" attribute, which if provided shall include one of the following attributes:
  - 1) identification of an individual UE via a "gpsi" attribute; or
  - 2) identification of a group of UE(s) via a "exterGroupId" attribute; or
  - 3) identification of any UE via the "anyUeInd" attribute.

Upon receipt of the HTTP POST request from the AF, if the AF is authorized, the NEF shall interact with the UDM by using Nudm\_SubscriberDataManagement service as defined in 3GPP TS 29.503 [17] to translate the GPSI or external group identifier into the corresponding SUPI or internal group identifier. After receiving a successful response from the UDM, the NEF shall interact with the NWDAF to subscribe to the subscription to the analytics information by using the Nnwdaf\_EventsSubscription service as defined in 3GPP TS 29.520 [27]. If the NEF receives an error code from the NWDAF, the NEF shall not create the resource and shall respond to the AF with a proper error status code.

In order to update an existing analytics exposure subscription, the AF shall send an HTTP PUT message to the NEF to the resource "Individual Analytics Exposure Subscription" requesting to change the subscription.

In order to delete an existing analytics exposure subscription, the AF shall send an HTTP DELETE message to the NEF to the resource "Individual Analytics Exposure Subscription".

Upon receipt of the HTTP PUT or DELETE request from the AF, if the AF is authorized, the NEF shall interact with the NWDAF to modify or cancel the subscription to the analytics information by using the Nnwdaf\_EventsSubscription service as defined in 3GPP TS 29.520 [27]. If the NEF receives an error code from the NWDAF, the NEF shall not update or delete the resource and shall respond to the AF with a proper error status code.

After receiving a successful response from the NWDAF, the NEF shall,

- for the HTTP POST request, create a resource "Individual Analytics Exposure Subscription" which represents the analytics exposure subscription, addressed by a URI that contains the AF Identifier and an NEF-created subscription identifier, and shall respond to the AF with a 201 Created status code, including a Location header field containing the URI for the created resource. The AF shall use the URI received in the Location header in subsequent requests to the NEF to refer to this analytics exposure subscription. If not all the requested analytics events in the subscription are accepted, then the NEF may include the "failEventReports" attribute indicating the event(s) for which the subscription failed and the associated reason(s).
- for the HTTP PUT request, update a resource "Individual Analytics Exposure Subscription" which represents the analytics exposure subscription, and shall responds to the AF with a 200 OK or 204 No Content status code. When responding with a 200 OK status code, if not all the requested analytics events in the subscription are modified successfully, then the NEF may include the "failEventReports" attribute indicating the event(s) for which the modification failed and the associated reason(s).
- for the HTTP DELETE request, remove all properties of the resource and delete the corresponding active resource "Individual Analytics Exposure Subscription" which represents the analytics exposure subscription, then shall responds to the AF with a 204 No Content status code.

If the immediate reporting indication in the "immRep" attribute within the "analyRepInfo" attribute sets to true during the HTTP POST or PUT request, the NEF shall also include the reports of the events subscribed, if available, in the HTTP POST or PUT response to the AF.

If the NEF receives an analytics information notification from the NWDAF indicating that the subscribed analytics event has been detected, the NEF shall provide a notification by sending HTTP POST message that include the AnalyticsEventNotification data structure at least with the detected analytics event to the AF identified by the notification URI together with the notification correlation identifier received during creation of the Individual Analytics Exposure Subscription. Upon receipt of the analytics event notification, the AF shall respond with a "204 No Content" status code to confirm the received notification.

#### 4.4.14.2 Fetch analytics information

The procedures are used by the AF to fetch analytics information via NEF.

In order to fetch analytics information, the AF shall send an HTTP POST message to the NEF to the customized operation URI "{apiRoot}/3gpp-analyticsexposure/v1/{afId}/fetch", the HTTP POST message shall include AnalyticsRequest data structure as request body. The AnalyticsRequest data structure shall include:

- identification of the analytics events as "analyEvent" attribute;

and may include:

- description of the analytics reporting information as "analyRep" attribute;
- an event filter as "analyEventFilter" attribute.
- indication of the UEs to which the analytics request applies via:
  - a) identification of an individual UE via a "gpsi" attribute; or
  - b) identification of a group of UE(s) via a "exterGroupId" attribute; or
  - c) identification of any UE via the "anyUeInd" attribute.

Upon the reception of an HTTP POST request, if the AF is authorized, the NEF shall interact with the UDM by using Nudm\_SubscriberDataManagement service as defined in 3GPP TS 29.503 [17] to translate the GPSI or external group identifier into the corresponding SUPI or internal group identifier. After receiving a successful response from the UDM, the NEF shall interact with the NWDAF by using Nnwdaf\_AnalyticsInfo service as defined in 3GPP TS 29.520 [27]. If the NEF receives an error code from the NWDAF, the NEF shall respond to the AF with a proper error status code. If a successful response including analytics information is received from the NWDAF, the NEF shall translate the network internal information to external information (e.g. SUPI to GPSI, Internal Group ID to External Group ID) and send an HTTP POST response to the AF by including analytics information within the AnalyticsData data structure.

### 4.4.15 Procedures for 5G LAN Parameter Provisioning

#### 4.4.15.1 General

The procedures are used by the AF to provision 5G LAN type service related parameters to the NEF. The following procedures support:

- Management of 5G Virtual Network group membership; and/or
- Management of 5G Virtual Network group data

#### 4.4.15.2 Creation of a new subscription for 5G LAN parameter provisioning

In order to create a new subscription to provision 5G LAN related parameters, the AF shall initiate an HTTP POST request to the NEF for the "5GLAN Parameters Provision Subscriptions" resource. The body of the HTTP POST message shall include the 5G LAN service related parameters within the "5gLanParams" attribute.

Upon receipt of the corresponding HTTP POST message, if the AF is authorized by the NEF to provision the parameters, the NEF shall interact with the UDM to create a subscription at the UDM by using

Nudm\_ParameterProvision service as defined in 3GPP TS 29.503 [17]. If the request is accepted by the UDM and the UDM informs the NEF with a successful response, the NEF shall create a new subscription and assign a subscription identifier for the "Individual 5GLAN Parameters Provision Subscription" resource. Then the NEF shall send a HTTP "201 Created" response with 5GLanParametersProvision data structure as response body and a Location header field containing the URI of the created individual subscription resource.

#### 4.4.15.3 Modification of an existing subscription for 5G LAN parameter provisioning

To modify an existing subscription to provision 5G LAN parameters, the AF shall initiate an HTTP PUT/PATCH request to the NEF for the "Individual 5GLAN Parameters Provision Subscription" resource. The body of the HTTP PUT message shall include the 5GLanParametersProvision data type as defined in subclause 5.7.2.3.2. The body of the HTTP PATCH message shall include the 5GLanParametersProvisionPatch data as defined in subclause 5.7.2.3.5. The External Group Identifier, DNN, S-NSSAI and PDU session type(s) within the "5gLanParams" attribute shall not be updated/modified.

Upon reception of the corresponding HTTP PUT/PATCH message, if the AF is authorized by the NEF to provision the parameters, the NEF shall interact with the UDM to modify an existing subscription at the UDM by using Nudm\_ParameterProvision service as defined in 3GPP TS 29.503 [17]. If the modification request is accepted by the UDM and the UDM informs the NEF with a successful response, the NEF shall update the existing subscription for the "Individual 5GLAN Parameters Provision Subscription" resource. Then the NEF shall send a HTTP response including "200 OK" status code with 5GLanParametersProvision data structure or "204 No Content" status code.

#### 4.4.15.4 Deletion of an existing subscription for 5G LAN parameter provisioning

To delete an existing subscription to 5GLAN provision parameters, the AF shall initiate an HTTP DELETE request to the NEF for the "Individual 5GLAN Parameters Provision Subscription" resource.

Upon receipt of the corresponding HTTP DELETE message, if the AF is authorized, the NEF shall interact with the UDM to delete an existing parameters provision subscription at the UDM by using Nudm\_ParameterProvision service as defined in 3GPP TS 29.503 [17]. If the request is accepted by the UDM and informs the NEF with a successful response, the NEF shall delete the existing subscription for the "Individual 5GLAN Parameters Provision Subscription" resource. Then the NEF shall send a HTTP "204 No Content" response.

### 4.4.16 Procedures for applying BDT policy

In order to create a resource for the applying a previously negotiated Background Data Transfer Policy to a UE or a Group of UEs, the AF shall send an HTTP POST message to the NEF to the resource "Applied BDT Policy Subscriptions". The body of the HTTP POST message shall contain the external Group Identifier or external Identifier, and the Background Data Transfer Reference ID for a previously negotiated policy of a background data transfer.

Upon receipt of the HTTP POST request from the AF, if the AF is authorized, the NEF shall interact with the UDM by invoking the Nudm\_SubscriberDataManagement service as described in 3GPP TS 29.503 [17] to retrieve the SUPI or Internal Group Identifier.

In order to update an existing applied BDT policy subscription, the AF shall send an HTTP PATCH message to the resource "Individual Applied BDT Policy Subscription" requesting to change the applied BDT policy. The AF shall include in the body of the HTTP PATCH request the new Background Data Transfer Reference ID.

In order to delete an existing applied BDT policy subscription, the AF shall send an HTTP DELETE message to the NEF to the resource "Individual Applied BDT Policy Subscription".

The NEF shall interact with the UDR by invoking the Nudr\_DataRepository service as described in 3GPP TS 29.504 [20], if the NEF receives an error code from the UDR, the NEF shall not create, update or delete the resource and shall respond to the AF with a proper error status code.

After receiving a successful response from the UDR, the NEF shall:

- for the HTTP POST request, create a resource "Individual Applied BDT Policy Subscription" addressed by a URI that contains the AF Identifier and an NEF-created subscription identifier, and shall respond to the AF with a "201 Created" status code, including a Location header field containing the URI of the created resource. The AF shall use the URI received in the Location header in subsequent requests to the NEF to refer to this resource.

- for the HTTP PATCH request, update a resource "Individual Applied BDT Policy Subscription" which represents the applied BDT policy subscription, and shall respond to the AF with a "200 OK" or "204 No Content" status code.
- for the HTTP DELETE request, delete the corresponding active resource "Individual Applied BDT Policy Subscription", and shall respond to the AF with a "204 No Content" status code.

#### 4.4.17 Procedures for Enhanced Coverage Restriction Control

The procedures for network configuration parameters provisioning as described in subclause 4.4.11 of 3GPP TS 29.122 [4] shall be applicable in 5GS with the following differences:

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- description of the HSS applies to the UDM; and
- upon receipt of HTTP POST request from the AF to query the current status of enhanced coverage restriction, the NEF shall interact with the UDM by using the Nudm\_SubscriberDataManagement service as specified in 3GPP TS 29.503 [17].
- upon receipt of HTTP POST request from the AF to configure the enhanced coverage restriction, the NEF shall interact with the UDM by using the Nudm\_ParameterProvision service as specified in 3GPP TS 29.503 [17].
- if the ECR\_WB\_5G feature is supported, in order to configure the enhanced coverage restriction for WB UE, the HTTP POST request message shall include the WB mode related enhanced coverage restriction information via the "ecrDataWbs" attribute for the WB UE.

#### 4.4.18 Procedures for IPTV Configuration

The procedures are used by the AF to authorize the request and forward the request for IPTV configuration information via NEF.

In order to configure IPTV information, the AF shall send an HTTP POST message to the NEF to the resource "IPTV Configurations", the HTTP POST message shall include IptvConfigData data structure as request body. The IptvConfigData data structure shall include:

- indication of the UEs to which the subscription applies via:
  - a) identification of an individual UE via a "gpsi" attribute; or
  - b) identification of a group of UE(s) via a "exterGroupId" attribute;
- an application identifier as "appId" attribute; and
- a list of Multicast Access Control as "multiAccCtrls" attribute;

and may include:

- an DNN as "dnn" attribute;
- an S-NSSAI as "snssai" attribute;
- MTC Provider Information as "mtcProviderId" attribute.

**NOTE:** The NEF can check the received MTC Provider Id information and reject the IPTV configuration request upon failure checking result.

In order to update an existing individual IPTV configuration, the AF shall send an HTTP PUT or HTTP PATCH message to the NEF to the resource "Individual IPTV Configuration" requesting to change the subscription. The External Group Identifier, GPSI, DNN, S-NSSAI and Application Identifier shall remain unchanged from previous values in the HTTP PUT message.

In order to delete an existing individual IPTV configuration, the AF shall send an HTTP DELETE message to the NEF to the resource "Individual IPTV Configuration".

Upon receipt of the HTTP request from the AF, if the AF is authorized, the NEF shall interact with the UDM by invoking the Nudm\_SubscriberDataManagement service as described in 3GPP TS 29.503 [17] to retrieve the SUPI or Internal Group Identifier. Then the NEF shall interact with the UDR to create, update or delete the IPTV configuration by using the Nudr\_DataRepository service as defined in 3GPP TS 29.519 [23]. If the NEF receives an error code from the UDR, the NEF shall not create, update or delete the resource and shall respond to the AF with a proper error status code.

After receiving a successful response from the UDR, the NEF shall,

- for the HTTP POST request, create a resource "Individual IPTV Configuration" which represents the IPTV configuration request, addressed by a URI that contains the AF Identifier and an NEF-created configuration identifier, and shall respond to the AF with a 201 Created status code, including a Location header field containing the URI for the created resource. The AF shall use the URI received in the Location header in subsequent requests to the NEF to refer to this IPTV configuration.
- for the HTTP PUT or HTTP PATCH request, update a resource "Individual IPTV Configuration" which represents the IPTV configuration, and shall responds to the AF with a 200 OK or 204 No Content status code.
- for the HTTP DELETE request, remove all properties of the resource and delete the corresponding active resource "Individual IPTV Configuration", then shall responds to the AF with a 204 No Content status code.

#### 4.4.19 Procedures for Location Privacy Indication Parameters Provisioning

The procedures are used by the AF to provision Location Privacy Indication parameters to the NEF. The procedures are applicable for an individual UE or a group of UEs.

In order to provision Location Privacy Indication parameters, the AF shall initiate an HTTP POST request to the NEF for the "LPI Parameters Provisionings" resource. The body of the HTTP POST message shall include the Location Privacy Indication related parameters within the LpiParametersProvision data structure.

Upon receipt of the corresponding HTTP POST message, if the AF is authorized by the NEF to provision the parameters, the NEF shall interact with the UDM to create a resource at the UDM by using Nudm\_ParameterProvision service as defined in 3GPP TS 29.503 [17]. If the request is accepted by the UDM and the UDM informs the NEF with a successful response, the NEF shall create a new resource and assign an identifier for the "Individual LPI Parameters Provisioning" resource. Then the NEF shall send a HTTP "201 Created" response with LpiParametersProvision data structure as response body and a Location header field containing the URI of the created individual resource.

In order to update an existing individual LPI Parameters Provisioning, the AF may send an HTTP PUT message to the resource "Individual LPI Parameters Provisioning" requesting the NEF to change all properties in the existing resource. The body of the HTTP PUT request message shall include LpiParametersProvision data type as defined in subclause 5.10.2.3.2. The External Group Identifier or GPSI shall remain unchanged from previous values.

Upon receipt of the corresponding HTTP PUT message, if the AF is authorized by the NEF to provision the parameters, the NEF shall interact with the UDM to modify an existing resource at the UDM by using Nudm\_ParameterProvision service as defined in 3GPP TS 29.503 [17]. If the modification request is accepted by the UDM and the UDM informs the NEF with a successful response, the NEF shall update the existing resource for the "Individual LPI Parameters Provisioning" resource. Then the NEF shall send a HTTP response including "200 OK" status code with LpiParametersProvision data structure or "204 No Content" status code.

To delete an existing individual LPI Parameters Provisioning, the AF shall initiate an HTTP DELETE request to the NEF for the "Individual LPI Parameters Provisioning" resource.

Upon receipt of the corresponding HTTP DELETE message, if the AF is authorized, the NEF shall interact with the UDM to delete an existing LPI Parameters Provisioning at the UDM by using Nudm\_ParameterProvision service as defined in 3GPP TS 29.503 [17]. If the request is accepted by the UDM, the NEF shall delete the existing resource for the "Individual LPI Parameters Provisioning" resource. Then the NEF shall send a HTTP "204 No Content" response.

#### 4.4.20 Procedures for service specific parameter provisioning

The procedures are used by the AF to provide service specific parameters to 5G system via NEF.

In order to provision the service specific parameter, the AF shall send an HTTP POST message to the NEF to the resource "Service Parameter Subscriptions", the HTTP POST message shall include ServiceParameterData data structure as request body. The ServiceParameterData data structure shall include:

- service description via:
  - a) an combination of DNN and S-NSSAI within the "dnn" attribute and the "snssai" attribute respectively;
  - b) an AF service identifier within the "afServiceId" attribute; or
  - c) an application identifier within the "appId" attribute;
- indication of the UEs to which the subscription applies via:
  - a) identification of an individual UE within the "gpsi" attribute;
  - b) an IPv4 address of the UE within the "ueIpv4" attribute;
  - c) an IPv6 address of the UE within the "ueIpv6" attribute;
  - d) an MAC address of the UE within the "ueMac" attribute;
  - e) an identification of a group of UE(s) within the "externalGroupId" attribute; or
  - f) identification of any UE within the "anyUeInd" attribute.

NOTE: For V2X service parameter provisioning, only "anyUeInd", "gpsi" and "externalGroupId" attributes are applicable.

- service parameters for at least one of the following:
  - V2X service parameters via:
    - a) configuration parameters for V2X communication over PC5 within the "paramOverPc5" attribute; and/or
    - b) configuration parameters for V2X communication over Uu within the "paramOverUu" attribute.

In order to update an existing service parameter subscription, the AF shall send an HTTP PUT or HTTP PATCH message to the NEF to the resource "Individual Service Parameter Subscription" requesting to change the subscription.

In order to delete an existing service parameter subscription, the AF shall send an HTTP DELETE message to the NEF to the resource "Individual Service Parameter Subscription".

Upon receipt of the HTTP request from the AF, if the AF is authorized, the NEF shall interact with the UDM by invoking the Nudm\_SubscriberDataManagement service as described in 3GPP TS 29.503 [17] to retrieve the SUPI or Internal Group Identifier. Then the NEF shall interact with the UDR to create, update or delete the service parameter by using the Nudr\_DataRepository service as defined in 3GPP TS 29.519 [23]. If the NEF receives an error code from the UDR, the NEF shall not create, update or delete the resource and shall respond to the AF with a proper error status code.

After receiving a successful response from the UDR, the NEF shall,

- for the HTTP POST request, create a resource "Individual Service Parameter Subscription" which represents the Service Parameter provisioning request, addressed by a URI that contains the AF Identifier and an NEF-created configuration identifier, and shall respond to the AF with a 201 Created status code, including a Location header field containing the URI for the created resource. The AF shall use the URI received in the Location header in subsequent requests to the NEF to refer to this Service Parameter Subscription.
- for the HTTP PUT or HTTP PATCH request, update a resource "Individual Service Parameter Subscription" which represents the service parameter, and shall responds to the AF with a 200 OK or 204 No Content status code.
- for the HTTP DELETE request, remove all properties of the resource and delete the corresponding active resource "Individual Service Parameter Subscription", then shall responds to the AF with a 204 No Content status code.

## 4.4.21 Procedures for ACS configuration parameter provisioning

The procedures are used by the AF to provide ACS configuration information to 5G system via NEF.

In order to provision the ACS configuration information, the AF shall send an HTTP POST message to the NEF to the resource "ACS Configuration Subscriptions", the HTTP POST message shall include AcsConfigurationData data structure as request body. The AcsConfigurationData data structure shall include:

- the URL of the ACS or the address of the ACS within the "acsInfo" attribute; and
- indication of the UEs to which the subscription applies via:
  - a) identification of an individual UE via a "gpsi" attribute; or
  - b) identification of a group of UE(s) via a "exterGroupId" attribute.

In order to update an existing ACS configuration subscription, the AF shall send an HTTP PUT message to the NEF to the resource "Individual ACS Configuration Subscription" requesting to change the subscription. The body of the HTTP PUT request message shall include AcsConfigurationData data type. The External Group Identifier or GPSI shall remain unchanged from previous values.

In order to delete an existing ACS configuration subscription, the AF shall send an HTTP DELETE message to the NEF to the resource "Individual ACS configuration Subscription".

Upon receipt of the corresponding HTTP message, if the AF is authorized by the NEF to provision the parameters, the NEF shall interact with the UDM to create a subscription at the UDM by using Nudm\_ParameterProvision service as defined in 3GPP TS 29.503 [17].

After receiving a successful response from the UDM, the NEF shall,

- for the HTTP POST request, create a resource "Individual ACS Configuration Subscription" which represents the ACS configuration parameter provisioning request, addressed by a URI that contains the AF Identifier and an NEF-created configuration identifier, and shall respond to the AF with a 201 Created status code, including a Location header field containing the URI for the created resource. The AF shall use the URI received in the Location header in subsequent requests to the NEF to refer to this ACS Configuration Subscription.
- for the HTTP PUT request, update a resource "Individual ACS Configuration Subscription" which represents the ACS configuration, and shall responds to the AF with a 200 OK or 204 No Content status code.
- for the HTTP DELETE request, remove all properties of the resource and delete the corresponding active resource "Individual ACS Configuration Subscription", then shall responds to the AF with a 204 No Content status code.

## 4.4.22 Procedures for Mobile Originated Location Request

### 4.4.22.1 General

The procedure is used by NEF to transfer the updated UE location information to AF. The following procedure support:

- Notify the AF of the updated UE location information as described in subclause 6.2 of 3GPP TS 23.273 [36];

### 4.4.22.2 Location Update Notification triggered by UE

In order to notify the AF of the updated UE location information received from GMLC, the NEF shall initiate an HTTP POST request to the AF. The body of the HTTP POST message shall include the location information related to UE MO-LR within the LocUpdateData data structure.

Upon receipt of the corresponding HTTP POST message, if the AF cannot handle the location estimate of the UE, e.g. the UE does not register to the AF, the AF shall respond to the NEF with an error code. Otherwise, the AF shall handle the location estimate according to the Service Identity if provided, and send a HTTP response including "200 OK" status code with LocUpdateDataReply data structure.



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## 5 NEF Northbound APIs

### 5.1 Introduction

The NEF Northbound APIs are a set of APIs defining the related procedures and resources for the interaction between the NEF and the AF.

### 5.2 Information applicable to several APIs

The usage of HTTP, content type and URI structure definition, as specified in subclauses 5.2.2, 5.2.3 and 5.2.4 of 3GPP TS 29.122 [4] respectively, shall be applicable for NEF Northbound APIs.

The notification, error handling, feature negotiation, HTTP custom headers as specified in subclauses 5.2.5, 5.2.6, 5.2.7, 5.2.8 of 3GPP TS 29.122 [4] respectively, shall be applicable for NEF Northbound APIs except that the SCEF is replaced by the NEF and the SCS/AS is replaced by the AF.

The conventions for Open API specification files as specified in subclause 5.2.9 of 3GPP TS 29.122 [4] shall be applicable for NEF Northbound APIs.

### 5.3 Reused APIs

This subclause describes the northbound APIs which are applicable for both EPS and 5GS.

Table 5.3-1: Reused APIs applicable for both EPS and 5GS

| API Name                  | Differences   |
|---------------------------|---|
| ResourceManagementOfBdt   | <ul style="list-style-type: none"> <li>- The "LocBdt_5G" feature as described in subclause 5.4.4 of 3GPP TS 29.122 [4] may only be supported in 5G.</li> <li>- The "Group_Id" feature as described in subclause 5.4.4 of 3GPP TS 29.122 [4] may be supported in 5G.</li> <li>- The "BdtNotification_5G" feature as described in subclause 5.4.4 of 3GPP TS 29.122 [4] may only be supported in 5G.</li> </ul>   |
| PfdManagement             | The "FailureLocation_5G" feature as described in subclause 5.11.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  |
| MonitoringEvent           | <ul style="list-style-type: none"> <li>- The "Number_of_UEs_in_an_area_notification_5G" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.</li> <li>- The "Downlink_data_delivery_status_5G" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.</li> <li>- The "Availability_after_DDN_failure_notification_enhancement" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.</li> <li>- For the "Pdn_connectivity_status" feature, APN is equivalent to DNN; the non-IP PDN type is equivalent to the unstructured PDU session type; and the enumeration Interfacelndication value "PDN_GATEWAY" stands for PDU session anchored in UPF in 5G.</li> <li>- The "eLCS" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.</li> </ul> |
| DeviceTriggering          |   |
| CpProvisioning            | <ul style="list-style-type: none"> <li>- The "ExpectedUMT_5G" and "ExpectedUmtTime_5G" features as described in subclause 5.10.4 of 3GPP TS 29.122 [4] may only be supported in 5G.</li> <li>- The "ScheduledCommType_5G" feature as described in subclause 5.10.4 of 3GPP TS 29.122 [4] may only be supported in 5G.</li> </ul>  |
| ChargeableParty           | <ul style="list-style-type: none"> <li>- The "EthChgParty_5G" and "MacAddressRange_5G" features as described in subclause 5.5.4 of 3GPP TS 29.122 [4] may only be supported in 5G.</li> <li>- The events (i.e. LOSS_OF_BEARER, RECOVERY_OF_BEARER and RELEASE_OF_BEARER) do not apply for 5G.</li> </ul>  |
| AsSessionWithQoS          | <ul style="list-style-type: none"> <li>- The "EthAsSessionQoS_5G", "QoSMonitoring_5G", "MacAddressRange_5G" and "AlternativeQoS_5G" features as described in subclause 5.14.4 of 3GPP TS 29.122 [4] may only be supported in 5G.</li> <li>- The events (i.e. LOSS_OF_BEARER, RECOVERY_OF_BEARER and RELEASE_OF_BEARER) do not apply for 5G.</li> </ul>  |
| MsisdnLessMoSms           |   |
| NpConfiguration           | The "NpExpiry_5G" feature as described in subclause 5.13.4 of 3GPP TS 29.122 [4] may only be supported in 5G.   |
| NIDD                      |   |
| RacsParameterProvisioning |   |
| ECRControl                | The "ECR_WB_5G" feature as described in subclause 5.12.4 of 3GPP TS 29.122 [4] may only be supported in 5G.   |

## 5.4 TrafficInfluence API

### 5.4.1 Resources

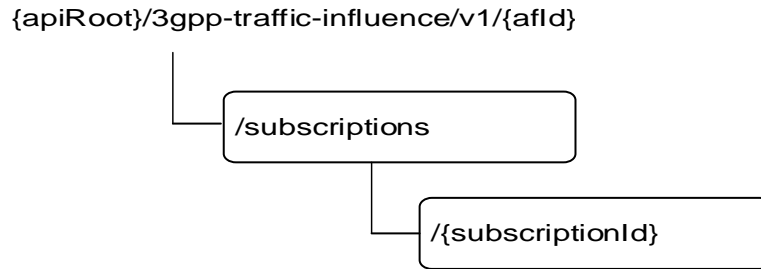
#### 5.4.1.1 Overview

All resource URIs of this API should have the following root:

**{apiRoot}/3gpp-traffic-influence/v1/**

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-traffic-influence" and "apiVersion" shall be set to "v1" for the current version defined in the present document. All resource URIs in the subclauses below are defined relative to the above root URI.

This subclause describes the structure for the Resource URIs as shown in figure 5.4.1.1-1 and the resources and HTTP methods used for the TrafficInfluence API.



**Figure 5.4.1.1-1: Resource URI structure of the TrafficInfluence API**

Table 5.4.1.1-1 provides an overview of the resources and HTTP methods applicable for the TrafficInfluence API.

**Table 5.4.1.1-1: Resources and methods overview**

| Resource name                             | Resource URI                            | HTTP method | Description  |
|---|---|-------------|--|
| Traffic Influence Subscription            | //{afId}/subscriptions                  | GET         | Read all subscriptions for a given AF  |
|   |   | POST        | Create a new subscription to traffic influence                                 |
| Individual Traffic Influence Subscription | //{afId}/subscriptions/{subscriptionId} | GET         | Read a subscription to traffic influence                                       |
|   |   | PUT         | Modify all of the properties of an existing subscription to traffic influence  |
|   |   | PATCH       | Modify part of the properties of an existing subscription to traffic influence |
|   |   | DELETE      | Delete a subscription to traffic influence                                     |

### 5.4.1.2 Resource: Traffic Influence Subscription

#### 5.4.1.2.1 Introduction

This resource allows a AF to read all active traffic influence subscriptions for the given AF.

#### 5.4.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-traffic-influence/v1/{afId}/subscriptions**

This resource shall support the resource URI variables defined in table 5.4.1.2.2-1.

**Table 5.4.1.2.2-1: Resource URI variables for this resource**

| Name    | Data type | Definition                             |
|---------|-----------|--|
| apiRoot | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4]. |
| afId    | string    | Identifier of the AF.                  |

#### 5.4.1.2.3 Resource Methods

##### 5.4.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.4.1.2.2.

## 5.4.1.2.3.2 GET

The GET method allows to read all active subscriptions for a given AF. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.4.1.2.3.2-1.

**Table 5.4.1.2.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.4.1.2.3.2-2 and the response data structures and response codes specified in table 5.4.1.2.3.2-3.

**Table 5.4.1.2.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.4.1.2.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| array(TrafficInfluSub)   | M | 0..N        | 200 OK                 | The subscription information for the AF in the request URI are returned.   |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.4.1.2.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.4.1.2.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.4.1.2.3.3 POST

The POST method creates a new subscription resource to traffic influence subscription for a given AF. The AF shall initiate the HTTP POST request message and the NEF shall respond to the message. The NEF shall construct the URI of the created resource.

This method shall support the request data structures specified in table 5.4.1.2.3.3-1 and the response data structures and response codes specified in table 5.4.1.2.3.3-2.

**Table 5.4.1.2.3.3-1: Data structures supported by the POST Request Body on this resource**

| Data type       | P | Cardinality | Description   |
|-----------------|---|-------------|---|
| TrafficInfluSub | M | 1           | Parameters to register a subscription to influencing traffic routing and/or notification about UP management events with the NEF. |

**Table 5.4.1.2.3.3-2: Data structures supported by the POST Response Body on this resource**

| Data type   | P | Cardinality | Response codes | Description  |
|---|---|-------------|----------------|--|
| TrafficInfluSub   | M | 1           | 201 Created    | The subscription was created successfully.<br>The URI of the created resource shall be returned in the "Location" HTTP header. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                |  |

**Table 5.4.1.2.3.3-3: Headers supported by the 201 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-traffic-influence/v1/{afId}/subscriptions/{subscriptionId} |

### 5.4.1.3 Resource: Individual Traffic Influence Subscription

#### 5.4.1.3.1 Introduction

This resource allows a AF to register a subscription to influencing traffic routing and/or notification about UP management events with the NEF.

#### 5.4.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-traffic-influence/v1/{afId}/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 5.4.1.3.2-1.

**Table 5.4.1.3.2-1: Resource URI variables for this resource**

| Name           | Data type | Definition                             |
|----------------|-----------|--|
| apiRoot        | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4]. |
| afId           | string    | Identifier of the AF.                  |
| subscriptionId | string    | Identifier of the subscription.        |

#### 5.4.1.3.3 Resource Methods

##### 5.4.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.4.1.3.2.

##### 5.4.1.3.3.2 GET

The GET method allows to read the active subscription for a given AF and subscription Id. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.4.1.3.3.2-1.

**Table 5.4.1.3.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.4.1.3.3.2-2 and the response data structures and response codes specified in table 5.4.1.3.3.2-3.

**Table 5.4.1.3.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.4.1.3.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| TrafficInfluSub  | M | 1           | 200 OK                 | The subscription information for the AF in the request URI are returned.   |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.4.1.3.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.4.1.3.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

### 5.4.1.3.3.3 PUT

The PUT method modifies an existing subscription resource to update a subscription. The AF shall initiate the HTTP PUT request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.4.1.3.3.3-1 and the response data structures and response codes specified in table 5.4.1.3.3.3-2.

**Table 5.4.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource**

| Data type       | P | Cardinality | Description   |
|-----------------|---|-------------|---|
| TrafficInfluSub | M | 1           | Modify an existing subscription to influencing traffic routing and/or notification about UP management events with the NEF. |

**Table 5.4.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description   |
|--|---|-------------|------------------------|---|
| TrafficInfluSub  | M | 1           | 200 OK                 | The subscription was updated successfully.  |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |   |

**Table 5.4.1.3.3.3-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.4.1.3.3.3-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

#### 5.4.1.3.3.4 PATCH

The PATCH method allows to change some properties of an existing traffic influence subscription. The AF shall initiate the HTTP PATCH request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.4.1.3.3.4-1 and the response data structures and response codes specified in table 5.4.1.3.3.4-2.

**Table 5.4.1.3.3.4-1: Data structures supported by the PATCH Request Body on this resource**

| Data type            | P | Cardinality | Description   |
|----------------------|---|-------------|---|
| TrafficInfluSubPatch | M | 1           | Partial update of a subscription to influencing traffic routing and/or notifications about UP management events with the NEF. |

**Table 5.4.1.3.3.4-2: Data structures supported by the PATCH Response Body on this resource**

| Data type       | P | Cardinality | Response codes         | Description   |
|-----------------|---|-------------|------------------------|---|
| TrafficInfluSub | M | 1           | 200 OK                 | The subscription was modified successfully.   |
| N/A             |   |             | 307 Temporary Redirect | Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |

|  |  |  |                              |   |
|--|--|--|------------------------------|---|
| N/A  |  |  | 308<br>Permanent<br>Redirect | Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |  |  |                              |   |

**Table 5.4.1.3.3.4-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.4.1.3.3.4-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

#### 5.4.1.3.3.5 DELETE

The DELETE method deletes the traffic influence subscription for a given AF. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.4.1.3.3.5-1.

**Table 5.4.1.3.3.5-1: URI query parameters supported by the DELETE method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.4.1.3.3.5-2 and the response data structures and response codes specified in table 5.4.1.3.3.5-3.

**Table 5.4.1.3.3.5-2: Data structures supported by the DELETE Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.4.1.3.3.5-3: Data structures supported by the DELETE Response Body on this resource**

| Data type   | P | Cardinality | Response codes         | Description  |
|---|---|-------------|------------------------|--|
| N/A   |   |             | 204 No Content         | The subscription was terminated successfully.  |
| N/A   |   |             | 307 Temporary Redirect | Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A   |   |             | 308 Permanent Redirect | Permanent redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |



**Table 5.4.1.3.3.5-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.4.1.3.3.5-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.4.2 Notifications

### 5.4.2.1 Introduction

Upon receipt of a UP management event notification from the SMF indicating the subscribed event (e.g. a DNAI has changed) is detected, the NEF shall send an HTTP POST message including the notified event to the AF.

Upon receipt of the event notification, the AF may send an HTTP POST request as acknowledgement for the UP path management event notification to inform the NEF about the result of application layer relocation.

The NEF and the AF shall support the notification mechanism as described in subclause 5.2.5 of 3GPP TS 29.122 [4].

**Table 5.4.2.1-1: Notifications overview**

| Notification                          | Callback URI              | HTTP method or custom operation | Description (service operation)   |
|---------------------------------------|---------------------------|---------------------------------|---|
| Event Notification                    | {notificationDestination} | POST                            | The UP management event notification from the NEF to the AF.  |
| Acknowledgement of event notification | {afAckUri}                | POST                            | The Acknowledgement of Event Notification is used by the AF to acknowledge the NEF about handling result of the event notification. |

### 5.4.2.2 Event Notification

#### 5.4.2.2.1 Description

The Event Notification is used by the NEF to report the UP path management event notification from the SMF to the AF.

#### 5.4.2.2.2 Target URI

The Callback URI "{notificationDestination}" shall be used with the callback URI variables defined in table 5.4.2.2.2-1.

**Table 5.4.2.2-1: Callback URI variables**

| Name                    | Data type | Definition   |
|-------------------------|-----------|--|
| notificationDestination | Link      | Callback reference provided by the AF during creation/modification of the subscription within the TrafficInfluSub data type as defined in Table 5.4.3.3.2-1. |

### 5.4.2.2.3 Operation Definition

#### 5.4.2.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.4.2.2.3.1-1 and the response data structures and response codes specified in table 5.4.2.2.3.1-2.

**Table 5.4.2.2.3.1-1: Data structures supported by the POST Request Body on this resource**

| Data type         | P | Cardinality | Description  |
|-------------------|---|-------------|--|
| EventNotification | M | 1           | The UP management event notification is provided by the NEF to the AF. |

**Table 5.4.2.2.3.1-2: Data structures supported by the POST Response Body on this resource**

| Data type | P | Cardinality | Response codes         | Description  |
|-----------|---|-------------|------------------------|--|
| N/A       |   |             | 204 No Content         | The event notification is received successfully.   |
| N/A       |   |             | 307 Temporary Redirect | Temporary redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A       |   |             | 308 Permanent Redirect | Permanent redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |

NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

**Table 5.4.2.2.3.1-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

**Table 5.4.2.2.3.1-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

#### 5.4.2.2.3.2 Notification via WebSocket

If supported by both AF and NEF and successfully negotiated, the EventNotification may alternatively be delivered through the WebSocket mechanism as defined in subclause 5.2.5.4 of 3GPP TS 29.122 [4].

### 5.4.2.3 Acknowledgement of event notification

#### 5.4.2.3.1 Description

The Acknowledgement of Event Notification is used by the AF to acknowledge the NEF about handling result of the event notification (e.g. UP path change).

## 5.4.2.3.2 Target URI

The Callback URI "{afAckUri}" shall be used with the callback URI variables defined in table 5.4.2.3.2-1.

Table 5.4.2.3.2-1: Callback URI variables

| Name     | Data type | Definition   |
|----------|-----------|--|
| afAckUri | Link      | Callback reference provided by the NEF during event notification within the EventNotification data type as defined in Table 5.4.3.3.4-1. |

## 5.4.2.3.3 Operation Definition

## 5.4.2.3.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.4.2.3.3.1-1 and the response data structures and response codes specified in table 5.4.2.3.3.1-2.

Table 5.4.2.3.3.1-1: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description  |
|-----------|---|-------------|--|
| AfAckInfo | M | 1           | Acknowledgement information of event notification. |

Table 5.4.2.3.3.1-2: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response codes         | Description  |
|-----------|---|-------------|------------------------|--|
| N/A       |   |             | 204 No Content         | The acknowledgement of event notification is received successfully.  |
| N/A       |   |             | 307 Temporary Redirect | Temporary redirection, during acknowledgement of event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative NEF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A       |   |             | 308 Permanent Redirect | Permanent redirection, during acknowledgement of event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative NEF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |

NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

Table 5.4.2.3.3.1-3: Headers supported by the 307 Response Code on this resource

| Name     | Data type | P | Cardinality | Description  |
|----------|-----------|---|-------------|--|
| Location | string    | M | 1           | An alternative URI representing the end point of an alternative NEF towards which the notification should be redirected. |

Table 5.4.2.3.3.1-4: Headers supported by the 308 Response Code on this resource

| Name     | Data type | P | Cardinality | Description  |
|----------|-----------|---|-------------|--|
| Location | string    | M | 1           | An alternative URI representing the end point of an alternative NEF towards which the notification should be redirected. |

## 5.4.3 Data Model

### 5.4.3.1 General

This subclause specifies the application data model supported by the TrafficInfluence API.

### 5.4.3.2 Reused data types

The data types reused by the TrafficInfluence API from other specifications are listed in table 5.4.3.2-1.

**Table 5.4.3.2-1: Re-used Data Types**

| Data type            | Reference  | Comments   |
|----------------------|--|--|
| Dnai                 | 3GPP TS 29.571 [8]   | Identifies a DNAI.   |
| DnaiChangeType       | 3GPP TS 29.571 [8]   | Describes the types of DNAI change.  |
| Dnn                  | 3GPP TS 29.571 [8]   | Identifies a DNN.  |
| EthFlowDescription   | 3GPP TS 29.514 [7]   | Contains the Ethernet data flow information. (NOTE)  |
| ExternalGroupId      | 3GPP TS 29.122 [4]   | External Group Identifier for a user group.  |
| FlowInfo             | 3GPP TS 29.122 [4]   | Contains the IP data flow information.   |
| Gpsi                 | 3GPP TS 29.571 [8]   | Identifies a GPSI.   |
| Ipv4Addr             | 3GPP TS 29.122 [4]   | Identifies an IPv4 address.  |
| Ipv6Addr             | 3GPP TS 29.122 [4]   | Identifies an IPv6 address.  |
| Ipv6Prefix           | 3GPP TS 29.571 [8]   | Identifies an IPv6 Prefix.   |
| Link                 | 3GPP TS 29.122 [4]   | Identifies a referenced resource.  |
| MacAddr48            | 3GPP TS 29.571 [8]   | Identifies a MAC address.  |
| Port                 | 3GPP TS 29.122 [4]   | Identifies a port number.  |
| RouteToLocation      | 3GPP TS 29.571 [8]   | Describes the traffic routes to the locations of the application.                              |
| Snsai                | 3GPP TS 29.571 [8]   | Identifies the S-NSSAI.  |
| SupportedFeatures    | 3GPP TS 29.571 [8]   | Used to negotiate the applicability of the optional features defined in table 5.4.4-1.         |
| TemporalValidity     | 3GPP TS 29.514 [7]   | Indicates the time interval(s) during which the AF request is to be applied                    |
| WebsocketNotifConfig | 3GPP TS 29.122 [4]   | Contains the configuration parameters to set up notification delivery over Websocket protocol. |
| NOTE:                | In order to support a set of MAC addresses with a specific range in the traffic filter, feature MacAddressRange as specified in clause 5.4.4 shall be supported. |  |

### 5.4.3.3 Structured data types

#### 5.4.3.3.1 Introduction

This clause defines the structured data types to be used in resource representations.

#### 5.4.3.3.2 Type: TrafficInfluSub

This type represents a traffic influence subscription. The same structure is used in the subscription request and subscription response.

**Table 5.4.3.3.2-1: Definition of type TrafficInfluSub**

| Attribute name          | Data type              | P | Cardinality | Description   | Applicability (NOTE 1)  |
|-------------------------|------------------------|---|-------------|---|-------------------------|
| afServiceId             | string                 | O | 0..1        | Identifies a service on behalf of which the AF is issuing the request.  |                         |
| afApplId                | string                 | O | 0..1        | Identifies an application. (NOTE 3)   |                         |
| afTransId               | string                 | O | 0..1        | Identifies an NEF Northbound interface transaction, generated by the AF.  |                         |
| appReloInd              | boolean                | O | 0..1        | Identifies whether an application can be relocated once a location of the application has been selected. Set to "true" if it can be relocated; otherwise set to "false". Default value is "false" if omitted. |                         |
| dnn                     | Dnn                    | O | 0..1        | Identifies a DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only.   |                         |
| snssai                  | Snssai                 | O | 0..1        | Identifies an S-NSSAI.  |                         |
| externalGroupId         | ExternalGroupId        | O | 0..1        | Identifies a group of users. (NOTE 2)   |                         |
| anyUeInd                | boolean                | O | 0..1        | Identifies whether the AF request applies to any UE (i.e. all UEs). This attribute shall set to "true" if applicable for any UE, otherwise, set to "false". (NOTE 2)  |                         |
| subscribedEvents        | array(SubscribedEvent) | O | 1..N        | Identifies the requirement to be notified of the event(s).  |                         |
| gpsi                    | Gpsi                   | O | 0..1        | Identifies a user. (NOTE 2)   |                         |
| ipv4Addr                | Ipv4Addr               | O | 0..1        | Identifies the IPv4 address. (NOTE 2)   |                         |
| ipDomain                | string                 | O | 0..1        | The IPv4 address domain identifier. The attribute may only be provided if the ipv4Addr attribute is present.  |                         |
| ipv6Addr                | Ipv6Addr               | O | 0..1        | Identifies the IPv6 address. (NOTE 2)   |                         |
| macAddr                 | MacAddr48              | O | 0..1        | Identifies the MAC address. (NOTE 2)  |                         |
| dnaiChgType             | DnaiChangeType         | O | 0..1        | Identifies a type of notification regarding UP path management event.   |                         |
| notificationDestination | Link                   | C | 0..1        | Contains the Callback URL to receive the notification from the NEF. It shall be present if the "subscribedEvents" is present.   |                         |
| requestTestNotification | boolean                | O | 0..1        | Set to true by the AF to request the NEF to send a test notification as defined in subclause 5.2.5.3 of 3GPP TS 29.122 [4]. Set to false or omitted otherwise.  | Notification_test_event |

|                    |   |   |      |   |                        |
|--------------------|---|---|------|---|------------------------|
| websockNotifConfig | WebsockNotifConfig  | O | 0..1 | Configuration parameters to set up notification delivery over Websocket protocol.   | Notification_websocket |
| self               | Link  | C | 0..1 | Link to the created resource.<br><br>This parameter shall be supplied by the NEF in HTTP responses that include an object of TrafficInfluSub type   |                        |
| trafficFilters     | array(FlowInfo)   | O | 1..N | Identifies IP packet filters.<br>(NOTE 3)   |                        |
| ethTrafficFilters  | array(EthFlowDescription)   | O | 1..N | Identifies Ethernet packet filters.<br>(NOTE 3)   |                        |
| trafficRoutes      | array(RouteToLocation)  | O | 1..N | Identifies the N6 traffic routing requirement.  |                        |
| ffcCorrInd         | boolean   | O | 0..1 | Indication of traffic correlation. May only be included when "externalGroupId" attribute was included within the TrafficInfluSub data type previously.<br>It is used to indicate that for the group of UEs, the targeted PDU sessions should be correlated by a common DNAI. Set to "true" if it should be correlated; otherwise set to "false". Default value is "false" if omitted. |                        |
| tempValidities     | array(TemporalValidity)   | O | 0..N | Indicates the time interval(s) during which the AF request is to be applied.  |                        |
| validGeoZoneIds    | array(string)   | O | 1..N | Identifies a geographic zone that the AF request applies only to the traffic of UE(s) located in this specific zone.  |                        |
| afAckInd           | boolean   | O | 0..1 | Identifies whether the AF acknowledgement of UP path event notification is expected. Set to "true" if the AF acknowledge is expected; otherwise set to "false". Default value is "false" if omitted.  | URLLC                  |
| addrPreserInd      | boolean   | O | 0..1 | Indicates whether UE IP address should be preserved. This attribute shall set to "true" if preserved, otherwise, set to "false". Default value is "false" if omitted.   | URLLC                  |
| suppFeat           | SupportedFeatures   | C | 0..1 | Indicates the list of Supported features used as described in subclause 5.4.4.<br>This attribute shall be provided in the POST request and in the response of successful resource creation.   |                        |
| NOTE 1:            | Properties marked with a feature as defined in subclause 5.4.4 are applicable as described in subclause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features. |   |      |   |                        |
| NOTE 2:            | One of individual UE identifier (i.e. "gpsid", "macAddr", "ipv4Addr" or "ipv6Addr"), External Group Identifier (i.e. "externalGroupid") or any UE indication "anyUeInd" shall be included.                          |   |      |   |                        |
| NOTE 3:            | One of "afAppld", "trafficFilters" or "ethTrafficFilters" shall be included.  |   |      |   |                        |

## 5.4.3.3.3 Type: TrafficInfluSubPatch

This type represents a subscription of traffic influence parameters provided by the AF to the NEF. The structure is used for HTTP PATCH request.

**Table 5.4.3.3.3-1: Definition of type TrafficInfluSubPatch**

| Attribute name    | Data type                 | P | Cardinality | Description   | Applicability |
|-------------------|---------------------------|---|-------------|---|---------------|
| appReloInd        | boolean                   | O | 0..1        | Identifies whether an application can be relocated once a location of the application has been selected.<br>(NOTE)  |               |
| trafficFilters    | array(FlowInfo)           | O | 1..N        | Identifies IP packet filters.   |               |
| ethTrafficFilters | array(EthFlowDescription) | O | 1..N        | Identifies Ethernet packet filters.   |               |
| trafficRoutes     | array(RouteToLocation)    | O | 1..N        | Identifies the N6 traffic routing requirement.<br>(NOTE)  |               |
| tfCorrInd         | boolean                   | O | 0..1        | Indication of traffic correlation. May only be included when "externalGroupId" attribute was included within the TrafficInfluSub data type previously. It is used to indicate that for the group of UEs, the targeted PDU sessions should be correlated by a common DNAI. |               |
| tempValidities    | array(TemporalValidity)   | O | 1..N        | Indicates the time interval(s) during which the AF request is to be applied.<br>(NOTE)  |               |
| validGeoZonelds   | array(string)             | O | 1..N        | Identifies a geographic zone that the AF request applies only to the traffic of UE(s) located in this specific zone.<br>(NOTE)  |               |
| afAckInd          | boolean                   | O | 0..1        | Identifies whether the AF acknowledgement of UP path event notification is expected.  | URLLC         |
| addrPreserInd     | boolean                   | O | 0..1        | Indicates whether UE IP address should be preserved.<br>(NOTE)  | URLLC         |

NOTE: The value of the property shall be set to NULL for removal.



## 5.4.3.3.4 Type: EventNotification

Table 5.4.3.3.4-1: Definition of type EventNotification

| Attribute name   | Data type       | P | Cardinality | Description  | Applicability (NOTE 1) |
|--|-----------------|---|-------------|--|------------------------|
| afTransId  | string          | O | 0..1        | Identifies an NEF Northbound interface transaction, generated by the AF.   |                        |
| dnaiChgType  | DnaiChangeType  | M | 1           | Identifies the type of notification regarding UP path management event.  |                        |
| sourceTrafficRoute   | RouteToLocation | O | 0..1        | Identifies the N6 traffic routing information associated to the source DNAI.<br>May be present if the "subscribedEvent" sets to "UP_PATH_CHANGE". (NOTE 3) |                        |
| subscribedEvent  | SubscribedEvent | M | 1           | Identifies a UP path management event the AF requested to be notified of.  |                        |
| targetTrafficRoute   | RouteToLocation | O | 0..1        | Identifies the N6 traffic routing information associated to the target DNAI.<br>May be present if the "subscribedEvent" sets to "UP_PATH_CHANGE". (NOTE 3) |                        |
| sourceDnai   | Dnai            | O | 0..1        | Source DN Access Identifier. Shall be included for event "UP_PATH_CHANGE" if the DNAI changed (NOTE 2, NOTE 3).  |                        |
| targetDnai   | Dnai            | O | 0..1        | Target DN Access Identifier. Shall be included for event "UP_PATH_CHANGE" if the DNAI changed (NOTE 2, NOTE 3).  |                        |
| gpsi   | Gpsi            | O | 0..1        | Identifies a user.   |                        |
| srcUelpv4Addr  | Ipv4Addr        | O | 0..1        | The IPv4 Address of the served UE for the source DNAI.   |                        |
| srcUelpv6Prefix  | Ipv6Prefix      | O | 0..1        | The Ipv6 Address Prefix of the served UE for the source DNAI.  |                        |
| tgtUelpv4Addr  | Ipv4Addr        | O | 0..1        | The IPv4 Address of the served UE for the target DNAI.   |                        |
| tgtUelpv6Prefix  | Ipv6Prefix      | O | 0..1        | The Ipv6 Address Prefix of the served UE for the target DNAI.  |                        |
| ueMac  | MacAddr48       | O | 0..1        | UE MAC address of the served UE.   |                        |
| afAckUri   | Link            | O | 0..1        | The URI provided by the NEF for the AF acknowledgement.<br>May only be included for event "UP_PATH_CHANGE".  | URLLC                  |
| <p>NOTE 1: Properties marked with a feature as defined in subclause 5.4.4 are applicable as described in subclause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features.</p> <p>NOTE 2: If the DNAI is not changed while the N6 traffic routing information is changed, the "sourceDnai" attribute and "targetDnai" attribute shall not be provided.</p> <p>NOTE 3: The change from the UP path status where no DNAI applies to a status where a DNAI applies indicates the activation of the related AF request and therefore only the target DNAI and N6 traffic routing information is provided in the event notification; the change from the UP path status where a DNAI applies to a status where no DNAI applies indicates the de-activation of the related AF request and therefore only the source DNAI and N6 traffic routing information is provided in the event notification.</p> |                 |   |             |  |                        |

## 5.4.3.3.5 Type: AfResultInfo

**Table 5.4.3.3.5-1: Definition of type AfResultInfo**

| Attribute name | Data type       | P | Cardinality | Description  |
|----------------|-----------------|---|-------------|--|
| afStatus       | AfResultStatus  | M | 1           | Identifies the result of the application relocation.   |
| trafficRoute   | RouteToLocation | O | 0..1        | Identifies the N6 traffic routing information associated to the target DNAI.<br>May only be present if the "afStatus" sets to "SUCCESS". |

## 5.4.3.3.6 Type AfAckInfo

**Table 5.4.3.3.6-1: Definition of type AfAckInfo**

| Attribute name | Data type    | P | Cardinality | Description   | Applicability |
|----------------|--------------|---|-------------|---|---------------|
| afTransId      | string       | C | 0..1        | Identifies an NEF Northbound interface transaction, generated by the AF. It shall be provided if the AF has previously provided it. |               |
| ackResult      | AfResultInfo | M | 1           | Identifies the result of application layer handling.  |               |
| gpsi           | Gpsi         | O | 0..1        | Identifies a GPSI.  |               |

## 5.4.3.4 Simple data types and enumerations

## 5.4.3.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

## 5.4.3.4.2 Simple data types

The simple data types defined in table 5.4.3.4.2-1 shall be supported.

**Table 5.4.3.4.2-1: Simple data types**

| Type Name | Type Definition | Description | Applicability |
|-----------|-----------------|-------------|---------------|
|           |                 |             |               |

## 5.4.3.4.3 Enumeration: SubscribedEvent

The enumeration SubscribedEvent represents the type of UP patch management events of which the AF requests to be notified. It shall comply with the provisions defined in table 5.4.3.4.3-1.

**Table 5.4.3.4.3-1: Enumeration SubscribedEvent**

| Enumeration value | Description  |
|-------------------|--|
| UP_PATH_CHANGE    | The AF requests to be notified when the UP path changes for the PDU session. |

## 5.4.3.4.4 Enumeration: AfResultStatus

The enumeration AfResultStatus represents the status of application handling result. It shall comply with the provisions defined in table 5.4.3.4.4-1.

**Table 5.4.3.4.4-1: Enumeration AfResultStatus**

| Enumeration value | Description   |
|-------------------|---|
| SUCCESS           | The application layer is ready or the relocation is completed.                  |
| TEMP_CONGESTION   | The application relocation fails due to temporary congestion.                   |
| RELOC_NO_ALLOWED  | The application relocation fails because application relocation is not allowed. |
| OTHER             | The application relocation fails due to other reason.                           |

## 5.4.4 Used Features

The table below defines the features applicable to the TrafficInfluence API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

**Table 5.4.4-1: Features used by TrafficInfluence API**

| Feature number  | Feature Name            | Description   |
|---|-------------------------|---|
| 1   | Notification_websocket  | The delivery of notifications over Websocket is supported as described in 3GPP TS 29.122 [4]. This feature requires that the Notification_test_event feature is also supported.   |
| 2   | Notification_test_event | The testing of notification connection is supported as described in 3GPP TS 29.122 [4].   |
| 3   | URLLC                   | This feature indicates support of Ultra Reliable Low Latency Communication (URLLC) requirements (i.e. AF application relocation acknowledgement and UE address(es) preservation). |
| 4   | MacAddressRange         | Indicates the support of a set of MAC addresses with a specific range in the traffic filter.  |
| Feature: A short name that can be used to refer to the bit and to the feature, e.g. "Notification". |                         |   |
| Description: A clear textual description of the feature.  |                         |   |

## 5.5 NiddConfigurationTrigger API

### 5.5.1 Resources

There is no resource defined for this API.

### 5.5.2 Notifications

#### 5.5.2.1 Introduction

Upon receipt of a NIDD connection establishment request from the SMF and there is no NIDD configuration for the UE, the NEF may send an HTTP POST message in order to trigger the AF to start the NIDD configuration procedure as described in subclause 5.6.3.2.3.4 of 3GPP TS 29.122 [4].

**Table 5.5.2.1-1: Notifications overview**

| Notification       | Callback URI      | HTTP method or custom operation | Description (service operation)            |
|--------------------|-------------------|---------------------------------|--|
| Event Notification | {notificationUri} | POST                            | Request for the NIDD Configuration Trigger |

#### 5.5.2.2 Event Notification

The Callback URI "{notificationUri}" shall be used with the callback URI variables defined in table 5.5.2.2-1.

**Table 5.5.2.2-1: Callback URI variables**

| Name            | Data type | Definition  |
|-----------------|-----------|---|
| notificationUri | Link      | A URI indicating the notification destination where N33 notification requests shall be delivered to.<br>This URI shall be preconfigured in the NEF. |

### 5.5.2.3 Operation Definition

#### 5.5.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.5.2.3.1-1 and the response data structures and response codes specified in table 5.5.2.3.1-2.

**Table 5.5.2.3.1-1: Data structures supported by the POST Request Body on this resource**

| Data type                 | P | Cardinality | Description  |
|---------------------------|---|-------------|--|
| NiddConfiguration Trigger | M | 1           | The NIDD Configuration Trigger is provided by the NEF to the AF. |

**Table 5.5.2.3.1-2: Data structures supported by the POST Response Body on this resource**

| Data type                     | P | Cardinality | Response codes         | Description   |
|-------------------------------|---|-------------|------------------------|---|
| NiddConfigurationTriggerReply | M | 1           | 200 OK                 | The trigger is received successfully.   |
| N/A                           |   |             | 307 Temporary Redirect | Temporary redirection, during Configuration Trigger. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A                           |   |             | 308 Permanent Redirect | Permanent redirection, during Configuration Trigger. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |

NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

**Table 5.5.2.3.1-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

**Table 5.5.2.3.1-3: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

#### 5.5.2.3.2 Notification via Websocket

Not specified in the present specification.

## 5.5.3 Data Model

### 5.5.3.1 General

This subclause specifies the application data model supported by the NiddConfigurationTrigger API.

### 5.5.3.2 Reused data types

The data types reused by the NiddConfigurationTrigger API from other specifications are listed in table 5.5.3.2-1.

**Table 5.5.3.2-1: Re-used Data Types**

| Data type         | Reference          | Comments   |
|-------------------|--------------------|--|
| Gpsi              | 3GPP TS 29.571 [8] | Identifies a GPSI.   |
| SupportedFeatures | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features defined in table 5.5.4-1. |

### 5.5.3.3 Structured data types

#### 5.5.3.3.1 Introduction

This clause defines the structured data types to be used in resource representations.

#### 5.5.3.3.2 Type: NiddConfigurationTrigger

This type represents a NIDD configuration trigger which is sent from the NEF to the AF.

**Table 5.5.3.3.2-1: Definition of type NiddConfigurationTrigger**

| Attribute name  | Data type         | P | Cardinality | Description  | Applicability (NOTE) |
|---|-------------------|---|-------------|--|----------------------|
| afld  | string            | M | 1           | Identifies the trigger receiving entity.                                       |                      |
| nefld   | string            | M | 1           | Identifies the trigger sending entity.   |                      |
| gpsi  | Gpsi              | M | 1           | Identifies a user.   |                      |
| suppFeat  | SupportedFeatures | M | 1           | Indicates the list of Supported features used as described in subclause 5.5.4. |                      |
| NOTE: Properties marked with a feature as defined in subclause 5.5.4 are applicable as described in subclause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features. |                   |   |             |  |                      |

#### 5.5.3.3.3 Type: NiddConfigurationTriggerReply

This data type represents a reply to a NIDD configuration trigger and is sent from the AF to the NEF.

**Table 5.15.2.1.3-1: Definition of type NiddConfigurationTriggerReply**

| Attribute name  | Data type         | P | Cardinality | Description  | Applicability (NOTE) |
|---|-------------------|---|-------------|--|----------------------|
| suppFeat  | SupportedFeatures | M | 1           | Indicates the list of Supported features used as described in subclause 5.5.4. |                      |
| NOTE: Properties marked with a feature as defined in subclause 5.5.4 are applicable as described in subclause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features. |                   |   |             |  |                      |

### 5.5.3.4 Simple data types and enumerations

#### 5.5.3.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

#### 5.5.3.4.2 Simple data types

The simple data types defined in table 5.5.3.4.2-1 shall be supported.

**Table 5.5.3.4.2-1: Simple data types**

| Type Name | Type Definition | Description | Applicability |
|-----------|-----------------|-------------|---------------|
|           |                 |             |               |

### 5.5.4 Used Features

The table below defines the features applicable to the NiddConfigurationTrigger API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

**Table 5.5.4-1: Features used by NiddConfigurationTrigger API**

| Feature number | Feature Name | Description |
|----------------|--------------|-------------|
|                |              |             |

## 5.6 AnalyticsExposure API

### 5.6.1 Resources

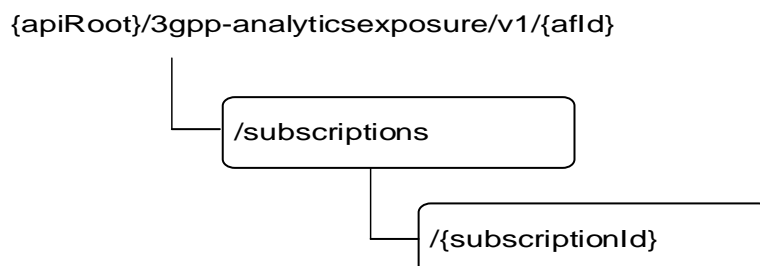
#### 5.6.1.1 Overview

All resource URIs of this API should have the following root:

**{apiRoot}/3gpp-analyticsexposure/v1/**

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-analyticsexposure" and "apiVersion" shall be set to "v1" for the current version defined in the present document. All resource URIs in the subclauses below are defined relative to the above root URI.

This subclause describes the structure for the Resource URIs as shown in figure 5.6.1.1-1 and the resources and HTTP methods used for the AnalyticsExposure API.



**Figure 5.6.1.1-1: Resource URI structure of the AnalyticsExposure API**

Table 5.6.1.1-1 provides an overview of the resources and HTTP methods applicable for the AnalyticsExposure API.

**Table 5.6.1.1-1: Resources and methods overview**

| Resource name                              | Resource URI                               | HTTP method | Description  |
|--|--|-------------|--|
| Analytics Exposure Subscriptions           | /{afld}/subscriptions                      | GET         | Read all subscriptions for a given AF  |
|  |  | POST        | Create a new subscription to analytics exposure                                |
| Individual Analytics Exposure Subscription | /{afld}/subscriptions<br>/{subscriptionId} | GET         | Read a subscription to analytics exposure                                      |
|  |  | PUT         | Modify all of the properties of an existing subscription to analytics exposure |
|  |  | DELETE      | Delete a subscription to analytics exposure                                    |

## 5.6.1.2 Resource: Analytics Exposure Subscriptions

### 5.6.1.2.1 Introduction

This resource allows a AF to read all active analytics exposure subscriptions for the given AF, or allows a AF to create a new subscription to retrieve analytics information.

### 5.6.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-analyticsexposure/v1/{afId}/subscriptions**

This resource shall support the resource URI variables defined in table 5.6.1.2.2-1.

**Table 5.6.1.2.2-1: Resource URI variables for this resource**

| Name    | Data type | Definition                             |
|---------|-----------|--|
| apiRoot | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4]. |
| afld    | string    | Identifier of the AF.                  |

### 5.6.1.2.3 Resource Methods

#### 5.6.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.6.1.2.2.

#### 5.6.1.2.3.2 GET

The GET method allows to read all active subscriptions for a given AF. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.6.1.2.3.2-1.

**Table 5.6.1.2.3.2-1: URI query parameters supported by the GET method on this resource**

| Name      | Data type         | P | Cardinality | Description  |
|-----------|-------------------|---|-------------|--|
| supp-feat | SupportedFeatures | O | 0..1        | The features supported by the NF service consumer. |

This method shall support the request data structures specified in table 5.6.1.2.3.2-2 and the response data structures and response codes specified in table 5.6.1.2.3.2-3.

**Table 5.6.1.2.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.6.1.2.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| array(AnalyticsExposureSubsc)  | M | 0..N        | 200 OK                 | The subscription information for the AF in the request URI are returned.   |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.6.1.2.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.6.1.2.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

### 5.6.1.2.3.3 POST

The POST method creates a new subscription resource to analytics exposure subscription for a given AF. The AF shall initiate the HTTP POST request message and the NEF shall respond to the message. The NEF shall construct the URI of the created resource.

This method shall support the request data structures specified in table 5.6.1.2.3.3-1 and the response data structures and response codes specified in table 5.6.1.2.3.3-2.

**Table 5.6.1.2.3.3-1: Data structures supported by the POST Request Body on this resource**

| Data type              | P | Cardinality | Description  |
|------------------------|---|-------------|--|
| AnalyticsExposureSubsc | M | 1           | Parameters to request a subscription to retrieve analytics information with the NEF. |

**Table 5.6.1.2.3.3-2: Data structures supported by the POST Response Body on this resource**

| Data type              | P | Cardinality | Response codes | Description  |
|------------------------|---|-------------|----------------|--|
| AnalyticsExposureSubsc | M | 1           | 201 Created    | The subscription was created successfully.<br>The URI of the created resource shall be returned in the "Location" HTTP header. |



NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

**Table 5.6.1.2.3.3-3: Headers supported by the 201 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-analyticsexposure/v1/{afId}/subscriptions/{subscriptionId} |

### 5.6.1.3 Resource: Individual Analytics Exposure Subscription

#### 5.6.1.3.1 Introduction

This resource allows a AF to read/modify/cancel a subscription to retrieve analytics information with the NEF.

#### 5.6.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-analyticsexposure/v1/{afId}/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 5.6.1.3.2-1.

**Table 5.6.1.3.2-1: Resource URI variables for this resource**

| Name           | Data type | Definition                               |
|----------------|-----------|--|
| apiRoot        | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4].   |
| afId           | string    | Identifier of the AF.                    |
| subscriptionId | string    | Identifier of the subscription resource. |

#### 5.6.1.3.3 Resource Methods

##### 5.6.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.6.1.3.2.

##### 5.6.1.3.3.2 GET

The GET method allows to read the active subscription for a given AF and subscription Id. The AF shall initiate the HTTP GET request message and theNEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.6.1.3.3.2-1.

**Table 5.6.1.3.3.2-1: URI query parameters supported by the GET method on this resource**

| Name      | Data type         | P | Cardinality | Description  |
|-----------|-------------------|---|-------------|--|
| supp-feat | SupportedFeatures | O | 0..1        | The features supported by the NF service consumer. |

This method shall support the request data structures specified in table 5.6.1.3.3.2-2 and the response data structures and response codes specified in table 5.6.1.3.3.2-3.

**Table 5.6.1.3.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.6.1.3.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| AnalyticsExposureSubsc   | M | 1           | 200 OK                 | The subscription information for the AF in the request URI are returned.   |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.6.1.3.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.6.1.3.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

### 5.6.1.3.3.3 PUT

The PUT method modifies an existing subscription resource to update a subscription. The AF shall initiate the HTTP PUT request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.6.1.3.3.3-1 and the response data structures and response codes specified in table 5.6.1.3.3.3-2.

**Table 5.6.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource**

| Data type              | P | Cardinality | Description   |
|------------------------|---|-------------|---|
| AnalyticsExposureSubsc | M | 1           | Modify an existing subscription to retrieve analytics information with the NEF. |

**Table 5.6.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource**

| Data type              | P | Cardinality | Response codes         | Description   |
|------------------------|---|-------------|------------------------|---|
| AnalyticsExposureSubsc | M | 1           | 200 OK                 | The subscription was updated successfully.  |
| N/A                    |   |             | 204 No Content         | The subscription was updated successfully.  |
| N/A                    |   |             | 307 Temporary Redirect | Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |

|  |  |  |                              |   |
|--|--|--|------------------------------|---|
| N/A  |  |  | 308<br>Permanent<br>Redirect | Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |  |  |                              |   |

**Table 5.6.1.3.3.3-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.6.1.3.3.3-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

#### 5.6.1.3.3.4 DELETE

The DELETE method deletes the analytics exposure subscription for a given AF. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.6.1.3.3.4-1.

**Table 5.6.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.6.1.3.3.4-2 and the response data structures and response codes specified in table 5.6.1.3.3.4-3.

**Table 5.6.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.6.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource**

| Data type   | P | Cardinality | Response codes         | Description  |
|---|---|-------------|------------------------|--|
| N/A   |   |             | 204 No Content         | The subscription was terminated successfully.  |
| N/A   |   |             | 307 Temporary Redirect | Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A   |   |             | 308 Permanent Redirect | Permanent redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.6.1.3.3.4-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.6.1.3.3.4-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.6.1a Custom Operations without associated resources

### 5.6.1a.1 Overview

Custom operations used for this API are summarized in table 5.6.1a.1-1. "apiRoot" is set as described in subclause 5.2.4 of 3GPP TS 29.122 [4].

**Table 5.6.1a.1-1: Custom operations without associated resources**

| Operation name | Custom operation URI                             | Mapped HTTP method | Description                            |
|----------------|--|--------------------|--|
| fetch          | {apiRoot}/3gpp-analyticsexposure/v1/{afId}/fetch | POST               | Request to fetch analytics information |

### 5.6.1a.2 Operation: fetch

#### 5.6.1a.2.1 Description

The custom operation allows a service consumer to fetch analytics information via the NEF.

#### 5.6.1a.2.2 Operation Definition

This operation shall support the response data structures and response codes specified in tables 5.6.1a.2.2-1 and 5.6.1a.2.2-2.

**Table 5.6.1a.2.2-1: Data structures supported by the POST Request Body on this resource**

| Data type        | P | Cardinality | Description   |
|------------------|---|-------------|---|
| AnalyticsRequest | M | 1           | Parameters to request to fetch analytics information. |

**Table 5.6.1a.2.2-2: Data structures supported by the POST Response Body on this resource**

| Data type   | P | Cardinality | Response codes         | Description   |
|---|---|-------------|------------------------|---|
| AnalyticsData   | M | 1           | 200 OK                 | The requested analytics information was returned successfully.  |
| n/a   |   |             | 204 No Content         | If the request Analytics data does not exist, the NEF shall respond with "204 No Content".  |
| N/A   |   |             | 307 Temporary Redirect | Temporary redirection, during analytics information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A   |   |             | 308 Permanent Redirect | Permanent redirection, during analytics information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |   |

**Table 5.6.1a.2.2-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.6.1a.2.2-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.6.2 Notifications

### 5.6.2.1 Introduction

Upon receipt of analytics information notification from the NWDAF indicating the subscribed analytics event is detected, the NEF shall send an HTTP POST message including the notified analytics event to the AF. The NEF and the AF shall support the notification mechanism as described in subclause 5.2.5 of 3GPP TS 29.122 [4].

**Table 5.6.2.1-1: Notifications overview**

| Notification       | Callback URI | HTTP method or custom operation | Description (service operation)                                    |
|--------------------|--------------|---------------------------------|--|
| Event Notification | {notifUri}   | POST                            | The analytics event notification is provided by the NEF to the AF. |

### 5.6.2.2 Event Notification

The Callback URI "{**notifUri**}" shall be used with the callback URI variables defined in table 5.6.2.2-1.

**Table 5.6.2.2-1: Callback URI variables**

| Name     | Definition   |
|----------|--|
| notifUri | Callback reference provided by the AF during creation of the subscription within the AnalyticsExposureSubsc data type as defined in Table 5.6.3.3.2-1. |

### 5.6.2.3 Operation Definition

#### 5.6.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.6.2.3.1-1 and the response data structures and response codes specified in table 5.6.2.3.1-2.

**Table 5.6.2.3.1-1: Data structures supported by the POST Request Body on this resource**

| Data type                  | P | Cardinality | Description  |
|----------------------------|---|-------------|--|
| AnalyticsEventNotification | M | 1           | The analytics event notification is provided by the NEF to the AF. |

**Table 5.6.2.3.1-2: Data structures supported by the POST Response Body on this resource**

| Data type   | P | Cardinality | Response codes         | Description  |
|---|---|-------------|------------------------|--|
| N/A   |   |             | 204 No Content         | The event notification is received successfully.   |
| N/A   |   |             | 307 Temporary Redirect | Temporary redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A   |   |             | 308 Permanent Redirect | Permanent redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.6.2.3.1-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

**Table 5.6.2.3.1-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

#### 5.6.2.3.2 Notification via WebSocket

If supported by both AF and NEF and successfully negotiated, the AnalyticsEventNotification may alternatively be delivered through the WebSocket mechanism as defined in subclause 5.2.5.4 of 3GPP TS 29.122 [4].

### 5.6.3 Data Model

#### 5.6.3.1 General

This subclause specifies the application data model supported by the AnalyticsExposure API.

### 5.6.3.2 Reused data types

The data types reused by the AnalyticsExposure API from other specifications are listed in table 5.6.3.2-1.

**Table 5.6.3.2-1: Re-used Data Types**

| Data type                  | Reference           | Comments   |
|----------------------------|---------------------|--|
| AdditionalMeasurement      | 3GPP TS 29.520 [27] |  |
| ReportingInformation       | 3GPP TS 29.523 [22] | Describes the analytics reporting requirement information.                             |
| BitRate                    | 3GPP TS 29.571 [8]  |  |
| CongestionType             | 3GPP TS 29.520 [27] |  |
| DateTime                   | 3GPP TS 29.122 [4]  |  |
| Dnn                        | 3GPP TS 29.571 [8]  |  |
| DurationSec                | 3GPP TS 29.122 [4]  | Seconds of duration.   |
| EventReportingRequirement  | 3GPP TS 29.520 [27] |  |
| ExternalGroupld            | 3GPP TS 29.122 [4]  | External Group Identifier for a user group.  |
| Exceptionld                | 3GPP TS 29.520 [27] |  |
| ExpectedAnalyticsType      | 3GPP TS 29.520 [27] |  |
| ExpectedUeBehaviourData    | 3GPP TS 29.503 [17] |  |
| Float                      | 3GPP TS 29.571 [8]  |  |
| Gpsi                       | 3GPP TS 29.571 [8]  | Identifies a GPSI.   |
| NetworkPerfRequirement     | 3GPP TS 29.520 [27] |  |
| QosRequirement             | 3GPP TS 29.520 [27] |  |
| RetainabilityThreshold     | 3GPP TS 29.520 [27] |  |
| SamplingRatio              | 3GPP TS 29.571 [8]  | Indicates Sampling Ratio.  |
| ScheduledCommunicationTime | 3GPP TS 29.122 [4]  |  |
| Snssai                     | 3GPP TS 29.571 [8]  |  |
| SupportedFeatures          | 3GPP TS 29.571 [8]  | Used to negotiate the applicability of the optional features defined in table 5.6.4-1. |
| ThresholdLevel             | 3GPP TS 29.520 [27] |  |
| TimeWindow                 | 3GPP TS 29.122 [4]  |  |
| UeCommunication            | 3GPP TS 29.520 [27] |  |
| UInteger                   | 3GPP TS 29.571 [8]  | Unsigned integer.  |
| Uri                        | 3GPP TS 29.571 [8]  | Identifies a referenced resource.  |
| LocationArea5G             | 3GPP TS 29.122 [4]  |  |

### 5.6.3.3 Structured data types

#### 5.6.3.3.1 Introduction

This clause defines the structured data types to be used in resource representations.

#### 5.6.3.3.2 Type: AnalyticsExposureSubsc

This type represents an analytics exposure subscription. The same structure is used in the subscription request and subscription response.

Table 5.6.3.3.2-1: Definition of type AnalyticsExposureSubsc

| Attribute name  | Data type                        | P | Cardinality | Description  | Applicability (NOTE)    |
|---|----------------------------------|---|-------------|--|-------------------------|
| analyEventsSubs   | array(AnalyticsEventSubsc)       | M | 1..N        | Subscribed analytics events.   |                         |
| analyRepInfo  | ReportingInformation             | O | 0..1        | Reporting requirement information of the subscription. If omitted, the default values within the ReportingInformation data type apply.   |                         |
| notifUri  | Uri                              | M | 1           | Notification URI for analytics event reporting.  |                         |
| notifId   | string                           | M | 1           | Notification Correlation ID assigned by the NF service consumer.   |                         |
| eventNotifis  | array(AnalyticsEventNotif)       | C | 1..N        | Represents the Events to be reported. Shall only be present if the immediate reporting indication in the "immRep" attribute within the "analyRepInfo" attribute sets to true during the event subscription, and the reports are available.   |                         |
| failEventReports  | array(AnalyticsFailureEventInfo) | O | 1..N        | Supplied by the NWDAF. When available, shall contain the event(s) for which the subscription is not successful, including the failure reason(s).   |                         |
| suppFeat  | SupportedFeatures                | C | 0..1        | Indicates the list of Supported features used as described in subclause 5.6.4. This attribute shall be provided in the POST request and in the response of successful resource creation, or in the HTTP GET response if the "supp-feat" attribute query parameter is included in the HTTP GET request. |                         |
| self  | Link                             | C | 0..1        | Identifies the Individual Analytics Exposure Subscription resource. Shall be present in the HTTP GET response when reading all the subscriptions for an AF.  |                         |
| requestTestNotification   | boolean                          | O | 0..1        | Set to true by the AF to request the NEF to send a test notification as defined in subclause 5.2.5.3 of 3GPP TS 29.122 [4]. Set to false or omitted otherwise.   | Notification_test_event |
| websocketNotifConfig  | WebsocketNotifConfig             | O | 0..1        | Configuration parameters to set up notification delivery over Websocket protocol.  | Notification_websocket  |
| NOTE: Properties marked with a feature as defined in subclause 5.6.4 are applicable as described in subclause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features. |                                  |   |             |  |                         |



## 5.6.3.3.3 Type: AnalyticsEventNotification

**Table 5.6.3.3.3-1: Definition of type AnalyticsEventNotification**

| Attribute name   | Data type                  | P | Cardinality | Description  | Applicability |
|------------------|----------------------------|---|-------------|--|---------------|
| notifId          | string                     | M | 1           | Notification Correlation ID assigned by the NF service consumer.   |               |
| analyEventNotifs | array(AnalyticsEventNotif) | M | 1..N        | Represents the analytics events to be reported according to the subscription corresponding to the Notification Correlation ID. |               |

## 5.6.3.3.4 Type: AnalyticsEventNotif

**Table 5.6.3.3.4-1: Definition of type AnalyticsEventNotif**

| Attribute name  | Data type                         | P | Cardinality | Description   | Applicability       |
|-----------------|-----------------------------------|---|-------------|---|---------------------|
| analyEvent      | AnalyticsEvent                    | M | 1           | Detected analytics event.   |                     |
| expiry          | DateTime                          | O | 0..1        | Defines the expiration time after which the analytics information will become invalid.  |                     |
| timeStamp       | DateTime                          | M | 1           | Time at which the event is observed.  |                     |
| ueMobilityInfos | array(UeMobilityExposure)         | C | 1..N        | Contains the UE mobility information. Shall be present if the "analyEvent" attribute sets to "UE_MOBILITY"                    | Ue_Mobility         |
| ueCommInfos     | array(UeCommunication)            | C | 1..N        | Contains the application communication information. Shall be present if the "analyEvent" attribute sets to "UE_COMM"          | Ue_Communication    |
| abnormalInfos   | array(AbnormalExposure)           | C | 1..N        | Contains the user's abnormal behavior information. Shall be present if the "analyEvent" attribute sets to "ABNORMAL_BEHAVIOR" | Abnormal_Behavior   |
| congestInfos    | array(CongestionInfo)             | C | 1..N        | Contains the UE's user data congestion information. Shall be present if the "analyEvent" attribute sets to "CONGESTION"       | Congestion          |
| nwPerfInfos     | array(NetworkPerformanceExposure) | C | 1..N        | The network performance information. Shall be present when the requested event is "NETWORK_PERFORMANCE".                      | Network_Performance |
| qosSustainInfos | array(QoS_SustainabilityExposure) | C | 1..N        | Contains the QoS sustainability information. Shall be present if the "analyEvent" attribute is set to "QOS_SUSTAINABILITY"    | QoS_Sustainability  |

## 5.6.3.3.5 Type: AnalyticsEventSubsc

**Table 5.6.3.3.5-1: Definition of type AnalyticsEventSubsc**

| Attribute name   | Data type                 | P | Cardinality | Description                        | Applicability |
|--|---------------------------|---|-------------|------------------------------------|---------------|
| analyEvent   | AnalyticsEvent            | M | 1           | Requested analytics event.         |               |
| analyEventFilter   | AnalyticsEventFilterSubsc | O | 0..1        | Represents analytics event filter. | (NOTE)        |
| tgtUe  | TargetUeId                | O | 0..1        | Identifies target UE information   | (NOTE)        |
| NOTE: Applicability is further described in the corresponding data type. |                           |   |             |                                    |               |

5.6.3.3.6 Type: AnalyticsEventFilterSubsc

**Table 5.6.3.3.6-1: Definition of type AnalyticsEventFilterSubsc**

| Attribute name | Data type                            | P | Cardinality | Description  | Applicability   |
|----------------|--------------------------------------|---|-------------|--|---|
| locArea        | LocationArea5G                       | O | 0..1        | Identification of network area to which the subscription applies. (NOTE 1) (NOTE 7)                                      | Abnormal_Behavior<br>Congestion<br>Ue_Communication<br>Ue_Mobility<br>QoS_Sustainability<br>Network_Performance |
| dnn            | Dnn                                  | O | 0..1        | Identifies the DNN. (NOTE 7)   | Ue_Communication<br>Abnormal_Behavior   |
| appIds         | array(ApplicationId)                 | O | 1..N        | Each element identifies an application. (NOTE 7)   | Abnormal_Behavior<br>Ue_Communication   |
| excepReqs      | array(Exception)                     | O | 1..N        | Represents a list of Exception Ids with associated thresholds. (NOTE 2, NOTE 3)  | Abnormal_Behavior   |
| exptAnaType    | ExpectedAnalyticsType                | O | 0..1        | Represents expected UE analytics type. (NOTE 3)  | Abnormal_Behavior   |
| exptUeBehav    | ExpectedUeBehaviourData              | O | 0..1        | Represents expected UE behaviour.  | Abnormal_Behavior   |
| reptThlds      | array(ThresholdLevel)                | O | 1..N        | Represents the congestion levels to be reached in order to be notified by the NEF. (NOTE 4)                              | Congestion  |
| nwPerfReqs     | array(NetworkPerformanceRequirement) | C | 1..N        | Represents the network performance requirements. This attribute shall be included when eventId is "NETWORK_PERFORMANCE". | Network_Performance   |
| snssai         | Snssai                               | O | 0..1        | Identifies the network slice information. (NOTE 7)   | Ue_Communication<br>QoS_Sustainability<br>Abnormal_Behavior<br>Congestion                                       |
| qosReq         | QosRequirement                       | C | 0..1        | Represents the QoS requirements. This attribute shall be included when eventId is "QOS_SUSTAINABILITY".                  | QoS_Sustainability  |
| qosFlowRetThds | array(RetainabilityThreshold)        | C | 1..N        | Represents the QoS flow retainability thresholds, Shall be supplied for the 5QI of GBR resource type. (NOTE 5)           | QoS_Sustainability  |
| ranUeThrouThds | array(BitRate)                       | C | 1..N        | Represents the RAN UE throughput thresholds. Shall be supplied for the 5QI of non-GBR resource type. (NOTE 5)            | QoS_Sustainability  |
| extraReportReq | EventReportingRequirement            | O | 0..1        | The extra event reporting requirement information. (NOTE 6)  |   |

NOTE 1: The NetworkAreaInfo within the "locArea" attribute is not applicable for the untrusted AF. For "NETWORK\_PERFORMANCE" or "CONGESTION" event, the "locArea" attribute shall be provided if the event applied for all UEs (i.e. "anyUeInd" attribute set to true within the TargetUeId data). For "QOS\_SUSTAINABILITY" event, the "locArea" attribute shall be provided.

NOTE 2: Only "exceptId" and "exceptLevel" within the Exception data type apply to the "exceptRequs" attribute.

NOTE 3: Either "exceptRequs" or "exptAnaType" shall be provided if the subscribed event is "ABNORMAL\_BEHAVIOR".

NOTE 4: If the subscribed event is "CONGESTION", this attribute shall be provided if "notifMethod" within "analyRepInfo" sets to "ON\_EVENT\_DETECTION" or omitted.

NOTE 5: For "QOS\_SUSTAINABILITY", this property shall be provided if the "notifMethod" in "analyRepInfo" is set to "ON\_EVENT\_DETECTION" or omitted.

NOTE 6: The "sampRatio" attribute within EventReportingRequirement data type is not applicable for the present API.

NOTE 7: For "ABNORMAL\_BEHAVIOR" event with "anyUeId" attribute in "tgtUe" attribute sets to true,

- at least one of the "locArea" and the "snssai" attribute should be included, if the expected analytics type via the "exptAnaType" attribute or the list of Exception Ids via the "exceptRequs" attribute is mobility related;
- at least one of the "locArea", "appIds", "dnn" and "snssai" attribute should be included, if the expected analytics type via the "exptAnaType" attribute or the list of Exception Ids via the "exceptRequs" attribute is communication related;
- the expected analytics type via the "exptAnaType" attribute or the list of Exception Ids via "exceptRequs" attribute shall not be requested for both mobility and communication related analytics at the same time.

5.6.3.3.7 Type TargetUeId

Table 5.6.3.3.7-1: Definition of type TargetUeId

| Attribute name   | Data type       | P | Cardinality | Description  | Applicability   |
|--|-----------------|---|-------------|--|---|
| anyUeInd   | boolean         | O | 0..1        | Identifies whether the AF request applies to any UE. This attribute shall set to "true" if applicable for any UE, otherwise, set to "false". | Abnormal_Behavior<br>Congestion<br>Network_Performance<br>QoS_Sustainability              |
| gpsi   | Gpsi            | O | 0..1        | Identifies a GPSI for an UE.   | Abnormal_Behavior<br>Congestion<br>Ue_Mobility<br>Ue_Communication<br>Network_Performance |
| exterGroupId   | ExternalGroupId | O | 0..1        | Represents an external group identifier and identifies a group of UEs.   | Abnormal_Behavior<br>Ue_Mobility<br>Ue_Communication<br>Network_Performance               |
| NOTE: For an applicable feature, only one attribute identifying the target UE shall be provided. |                 |   |             |  |   |

5.6.3.3.8 Void

5.6.3.3.9 Type UeMobilityExposure

**Table 5.6.3.3.9-1: Definition of type UeMobilityExposure**

| Attribute name  | Data type                  | P | Cardinality | Description  | Applicability |
|---|----------------------------|---|-------------|--|---------------|
| ts  | DateTime                   | O | 0..1        | This attribute identifies the timestamp when the UE arrives the location. (NOTE 1)   |               |
| recurringTime   | ScheduledCommunicationTime | O | 0..1        | Identifies time of the day and day of the week which are valid within the observation period when the UE moves. (NOTE 1, NOTE 2)   |               |
| duration  | DurationSec                | M | 1           | This attribute identifies the time duration the UE stays in the location.<br>If the analytics result applies for a group of UEs, it indicates the average duration for the group of UEs. |               |
| durationVariance  | Float                      | C | 0..1        | This attribute indicates the variance of the analysed durations for the group of UEs. It shall be provided if the analytics result applies for a group of UEs.                           |               |
| locInfo   | array(UeLocationInfo)      | M | 1..N        | This attribute includes a list of UE location information during the time duration.  |               |
| NOTE 1: Either ts or recurringTime shall be provided.   |                            |   |             |  |               |
| NOTE 2: If this attribute is present, it indicates the UE movement is periodic. This attribute is suitable to be present for a recurring mobility in a long observation time. |                            |   |             |  |               |

5.6.3.3.10 Type UeLocationInfo

**Table 5.6.3.3.10-1: Definition of type UeLocationInfo**

| Attribute name  | Data type      | P | Cardinality | Description  | Applicability |
|---|----------------|---|-------------|--|---------------|
| loc   | LocationArea5G | M | 1           | This attribute contains the detailed location.   |               |
| ratio   | SamplingRatio  | C | 0..1        | This attribute contains the percentage of UEs in the group. Shall be present if the analytics result applies for a group of UEs.               |               |
| confidence  | UInteger       | C | 0..1        | Indicates the confidence of the prediction. (NOTE)<br>Shall be present if the analytics result is a prediction.<br>Minimum = 0. Maximum = 100. |               |
| NOTE: If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned. |                |   |             |  |               |

5.6.3.3.11 Void

## 5.6.3.3.12 Type: AnalyticsRequest

**Table 5.6.3.3.12-1: Definition of type AnalyticsRequest**

| Attribute name   | Data type                 | P | Cardinality | Description  | Applicability |
|------------------|---------------------------|---|-------------|--|---------------|
| analyEvent       | AnalyticsEvent            | M | 1           | Identifies the analytics type.   |               |
| analyEventFilter | AnalyticsEventFilter      | C | 0..1        | Shall be included to identify the analytics when filter information is needed for the related event. |               |
| analyRep         | EventReportingRequirement | O | 0..1        | Identifies the analytics reporting requirement information.  |               |
| tgtUe            | TargetUeId                | O | 0..1        | Identifies the target UE information.  |               |
| suppFeat         | SupportedFeatures         | M | 1           | Represents the features supported by the NF service consumer.  |               |

## 5.6.3.3.13 Type AnalyticsEventFilter

Table 5.6.3.3.13-1: Definition of type AnalyticsEventFilter

| Attribute name   | Data type               | P | Cardinality | Description  | Applicability   |
|--|-------------------------|---|-------------|--|---|
| locArea  | LocationArea5G          | C | 0..1        | This IE represents the network area where the NF service consumer wants to know the analytics result. (NOTE 2, NOTE 3)   | Ue_Mobility<br>Ue_Communication<br>Network_Performance<br>QoS_Sustainability<br>Abnormal_Behavior<br>Congestion |
| dnn  | Dnn                     | O | 0..1        | Identifies the DNN. (NOTE 3)   | Ue_Communication<br>Abnormal_Behavior   |
| nwPerfTypes  | array(NetworkPerfType)  | C | 1..N        | Represents the network performance requirements. This attribute shall be included when eventId is "NETWORK_PERFORMANCE". | Network_Performance   |
| applds   | array(ApplicationId)    | O | 1..N        | Each element identifies an application. The absence of applds means all applications. (NOTE 3)                           | Ue_Communication<br>Abnormal_Behavior   |
| exceptds   | array(ExceptionId)      | O | 1..N        | Represents a list of Exception Ids. (NOTE 1)   | Abnormal_Behavior   |
| exptAnaType  | ExpectedAnalyticsType   | O | 0..1        | Represents expected UE analytics type. (NOTE 1)  | Abnormal_Behavior   |
| exptUeBehav  | ExpectedUeBehaviourData | O | 0..1        | Represents expected UE behaviour.  | Abnormal_Behavior   |
| snssai   | Snssai                  | O | 0..1        | Identifies the network slice information (NOTE 3)  | Ue_Communication<br>QoS_Sustainability<br>Abnormal_Behavior<br>Congestion                                       |
| qosReq   | QosRequirement          | C | 0..1        | Represents the QoS requirements. This attribute shall be included when analyEvent is "QOS_SUSTAINABILITY".               | QoS_Sustainability  |
| NOTE 1: Either "exceptds" or "exptAnaType" shall be provided if the subscribed event is "ABNORMAL_BEHAVIOR".   |                         |   |             |  |   |
| NOTE 2: The NetworkAreaInfo within the "locArea" attribute is not applicable for the untrusted AF. For "NETWORK_PERFORMANCE" or "CONGESTION" event, the "locArea" attribute shall be provided if the event applied for all UEs (i.e. "anyUeInd" attribute set to true within the TargetUeId data). For "QOS_SUSTAINABILITY" event, this attribute shall be provided.   |                         |   |             |  |   |
| NOTE 3: For "ABNORMAL_BEHAVIOR" event with "anyUeId" attribute in "tgtUe" attribute sets to true,  |                         |   |             |  |   |
| <ul style="list-style-type: none"> <li>- at least one of the "locArea" and the "snssai" attribute should be included, if the expected analytics type via the "exptAnaType" attribute or the list of Exception Ids via the "exceptds" attribute is mobility related;</li> <li>- at least one of the "locArea", "applds", "dnn" and "snssai" attribute should be included, if the expected analytics type via the "exptAnaType" attribute or the list of Exception Ids via the "exceptds" attribute is communication related;</li> <li>- the expected analytics type via the "exptAnaType" attribute or the list of Exception Ids via "exceptds" attribute shall not be requested for both mobility and communication related analytics at the same time.</li> </ul> |                         |   |             |  |   |



## 5.6.3.3.14 Type AnalyticsData

Table 5.6.3.3.14-1: Definition of type AnalyticsData

| Attribute name  | Data type                        | P | Cardinality | Description  | Applicability       |
|-----------------|----------------------------------|---|-------------|--|---------------------|
| expiry          | DateTime                         | O | 0..1        | Defines the expiration time after which the analytics information will become invalid.   |                     |
| ueMobilityInfos | array(UeMobilityExposure)        | C | 1..N        | Contains the UE mobility information.<br>Shall be present if the "analyEvent" attribute sets to "UE_MOBILITY"                    | Ue_Mobility         |
| ueCommInfos     | array(UeCommunication)           | C | 1..N        | Contains the application communication information.<br>Shall be present if the "analyEvent" attribute sets to "UE_COMM"          | Ue_Communication    |
| nwPerfInfos     | array(NetworkPerfExposure)       | C | 1..N        | The network performance information.<br>Shall be present when the requested event is "NETWORK_PERFORMANCE"                       | Network_Performance |
| abnormallInfos  | array(AbnormalExposure)          | C | 1..N        | Contains the user's abnormal behavior information.<br>Shall be present if the "analyEvent" attribute sets to "ABNORMAL_BEHAVIOR" | Abnormal_Behavior   |
| congestInfos    | array(CongestInfo)               | C | 1..N        | Contains the UE's user data congestion information.<br>Shall be present if the "analyEvent" attribute sets to "CONGESTION"       | Congestion          |
| qosSustainInfos | array(QosSustainabilityExposure) | C | 1..N        | Contains the QoS sustainability information.<br>Shall be present if the "analyEvent" attribute is set to "QOS_SUSTAINABILITY"    | QoS_Sustainability  |
| suppFeat        | SupportedFeatures                | M | 1           | Represents the features supported by both the AF and the NEF.  |                     |

## 5.6.3.3.15 Type AbnormalExposure

Table 5.6.3.3.15-1: Definition of type AbnormalExposure

| Attribute name  | Data type             | P | Cardinality | Description  | Applicability |
|---|-----------------------|---|-------------|--|---------------|
| gpsis   | array(Gpsi)           | C | 1..N        | Each element identifies a UE which is affected with the Exception. Shall be present if the subscription request applies to more than one UE.   |               |
| excep   | Exception             | M | 1           | Contains the exception information.  |               |
| appld   | ApplicationId         | O | 0..1        | Identifies an application. May only be present if the "appls" attribute was provided within AnalyticsEventFilter during the subscription for event notification procedure.             |               |
| ratio   | SamplingRatio         | C | 0..1        | This attribute contains the percentage of UEs with same analytics result in the group or among all UEs. Shall be present if the analytics result applies for a group of UEs or any UE. |               |
| confidence  | UInteger              | C | 0..1        | Indicates the confidence of the prediction. (NOTE) Shall be present if the analytics result is a prediction. Minimum = 0. Maximum = 100.   |               |
| addtMeasInfo  | AdditionalMeasurement | O | 0..1        | Additional measurement.  |               |
| NOTE: If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned. |                       |   |             |  |               |

## 5.6.3.3.16 Type CongestInfo

Table 5.6.3.3.16-1: Definition of type CongestInfo

| Attribute name | Data type                  | P | Cardinality | Description  | Applicability |
|----------------|----------------------------|---|-------------|--|---------------|
| locArea        | LocationArea5G             | M | 1           | Network area of interest   |               |
| cngAnas        | array(CongestionAnalytics) | M | 1..N        | Represents data congestion analytics for transfer over the user plane, control plane or both planes. |               |

## 5.6.3.3.17 Type CongestionAnalytics

Table 5.6.3.3.17-1: Definition of type CongestionAnalytics

| Attribute name  | Data type      | P | Cardinality | Description  | Applicability |
|---|----------------|---|-------------|--|---------------|
| cngType   | CongestionType | M | 1           | Represents congestion type.  |               |
| tmWdw   | TimeWindow     | M | 1           | Represents a start time and a stop time observed for the congestion information.   |               |
| nsi   | ThresholdLevel | M | 1           | Represents network congestion level.   |               |
| confidence  | UInteger       | C | 0..1        | Indicates the confidence of the prediction. (NOTE) Shall be present if the analytics result is a prediction. Minimum = 0. Maximum = 100. |               |
| NOTE: If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned. |                |   |             |  |               |

## 5.6.3.3.18 Type QoSustainabilityExposure

Table 5.6.3.3.18-1: Definition of type QoSustainabilityExposure

| Attribute name  | Data type              | P | Cardinality | Description  | Applicability |
|---|------------------------|---|-------------|--|---------------|
| locArea   | LocationArea5G         | M | 1           | Identification(s) of applicable location areas where the analytics result applies.   |               |
| startTs   | DateTime               | M | 1           | Represents the start time of the applicable observing period.  |               |
| endTs   | DateTime               | M | 1           | Represents the end time of the applicable observing period.  |               |
| qosFlowRetThd   | RetainabilityThreshold | O | 0..1        | The reporting QoS Flow Retainability Threshold that are met or crossed for 5QI of GBR resource type. (NOTE 1)                                    |               |
| ranUeThrouThd   | BitRate                | O | 0..1        | The reporting RAN UE Throughput Threshold that are met or crossed for 5QI of non-GBR resource type. (NOTE 1)                                     |               |
| confidence  | UInteger               | C | 0..1        | Indicates the confidence of the prediction. (NOTE 2)<br>Shall be present if the analytics result is a prediction.<br>Minimum = 0. Maximum = 100. |               |
| NOTE 1: Either qosFlowRetThd or ranUeThrouThd shall be provided.  |                        |   |             |  |               |
| NOTE 2: If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned. |                        |   |             |  |               |

## 5.6.3.3.19 Type NetworkPerfExposure

Table 5.6.3.3.19-1: Definition of type NetworkPerfExposure

| Attribute name  | Data type       | P | Cardinality | Description  | Applicability |
|---|-----------------|---|-------------|--|---------------|
| locArea   | LocationArea5G  | M | 1           | Identification of network area to which the subscription applies.  |               |
| nwPerfType  | NetworkPerfType | M | 1           | The type of the network performance  |               |
| relativeRatio   | SamplingRatio   | O | 0..1        | The reported relative ratio expressed in percentage. (NOTE 1)  |               |
| absoluteNum   | UInteger        | O | 0..1        | The reported absolute number (NOTE 1)  |               |
| confidence  | UInteger        | C | 0..1        | Indicates the confidence of the prediction. (NOTE 2)<br>Shall be present if the analytics result is a prediction.<br>Minimum = 0. Maximum = 100. |               |
| NOTE 1: Either relativeRatio or absoluteNum shall be provided.  |                 |   |             |  |               |
| NOTE 2: If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned. |                 |   |             |  |               |

## 5.6.3.3.20 Type AnalyticsFailureEventInfo

Table 5.6.3.3.20-1: Definition of type AnalyticsFailureEventInfo

| Attribute name | Data type            | P | Cardinality | Description                   | Applicability |
|----------------|----------------------|---|-------------|-------------------------------|---------------|
| event          | AnalyticsEvent       | M | 1           | Event that is subscribed.     |               |
| failureCode    | AnalyticsFailureCode | M | 1           | Identifies the failure reason |               |

## 5.6.3.4 Simple data types and enumerations

### 5.6.3.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

### 5.6.3.4.2 Simple data types

The simple data types defined in table 5.6.3.4.2-1 shall be supported.

**Table 5.6.3.4.2-1: Simple data types**

| Type Name | Type Definition | Description | Applicability |
|-----------|-----------------|-------------|---------------|
|           |                 |             |               |

### 5.6.3.4.3 Enumeration: AnalyticsEvent

The enumeration represents the type of analytics events of which the AF requests to be notified. It shall comply with the provisions defined in table 5.6.3.4.3-1.

**Table 5.6.3.4.3-1: Enumeration AnalyticsEvent**

| Enumeration value   | Description   | Applicability       |
|---------------------|---|---------------------|
| UE_MOBILITY         | The AF requests to be notified about analytics information of UE mobility.                      | Ue_Mobility         |
| UE_COMM             | The AF requests to be notified about analytics information of UE communication.                 | Ue_Communication    |
| ABNORMAL_BEHAVIOR   | The AF requests to be notified about analytics information of UE's abnormal behavior.           | Abnormal_Behavior   |
| CONGESTION          | The AF requests to be notified about analytics information of user data congestion information. | Congestion          |
| NETWORK_PERFORMANCE | The AF requests to be notified about analytics information of network performance information.  | Network_Performance |
| QOS_SUSTAINABILITY  | The AF requests to be notified about analytics information of QoS sustainability.               | QoS_Sustainability  |

### 5.6.3.4.4 Enumeration: AnalyticsFailureCode

**Table 5.6.3.4.4-1: Enumeration AnalyticsFailureCode**

| Enumeration value          | Description  | Applicability |
|----------------------------|--|---------------|
| BOTH_STAT_PRED_NOT_ALLOWED | The event is rejected since the start time is in the past and the end time is in the future, which means the NF service consumer requested both statistics and prediction for the analytics. |               |
| UNAVAILABLE_DATA           | The event is rejected since necessary data to perform the service is unavailable.  |               |
| OTHER                      | The event is rejected due to other reasons.  |               |

## 5.6.4 Used Features

The table below defines the features applicable to the AnalyticsExposure API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

**Table 5.6.4-1: Features used by AnalyticsExposure API**

| Feature number | Feature Name            | Description   |
|----------------|-------------------------|---|
| 1              | Ue_Mobility             | This feature indicates support for the analytics event related to UE mobility.  |
| 2              | Ue_Communication        | This feature indicates support for the analytics event related to UE communication information.   |
| 3              | Abnormal_Behavior       | This feature indicates support for the analytics event related to UE's abnormal behaviour.  |
| 4              | Congestion              | This feature indicates support for the analytics event related to UE's user data congestion information.  |
| 5              | Network_Performance     | This feature indicates support for the analytics event related to network performance.  |
| 6              | QoS_Sustainability      | This feature indicates support for the analytics event related to QoS sustainability.   |
| 7              | Notification_websocket  | The delivery of notifications over Websocket is supported as described in 3GPP TS 29.122 [4]. This feature requires that the Notification_test_event feature is also supported. |
| 8              | Notification_test_event | The testing of notification connection is supported as described in 3GPP TS 29.122 [4].   |

## 5.6.5 Error handling

### 5.6.5.1 General

HTTP error handling shall be supported as specified in subclause 5.2.6 of 3GPP TS 29.122 [4].

In addition, the requirements in the following subclauses shall apply.

### 5.6.5.2 Protocol Errors

In this Release of the specification, there are no additional protocol errors applicable for the AnalyticsExposure API.

### 5.6.5.3 Application Errors

The application errors defined for the AnalyticsExposure API are listed in table 5.6.5.3-1. The NEF shall include in the HTTP status code a "ProblemDetails" data structure with the "cause" attribute indicating the application error as listed in table 5.6.5.3-1.

**Table 5.6.5.3-1: Application errors**

| Application Error  | HTTP status code          | Description   |
|--|---------------------------|---|
| SUBSCRIPTION_NOT_FOUND   | 404 Not Found             | Indicates the Individual Analytics Exposure Subscription resource does not exist. (NOTE)  |
| BOTH_STAT_PRED_NOT_ALLOWED   | 400 Bad Request           | For the requested observation period, the start time is in the past and the end time is in the future, which means the AF requested both statistics and prediction for the analytics. |
| UNAVAILABLE_DATA   | 500 Internal Server Error | Indicates the requested statistics in the past is rejected since necessary data to perform the service is unavailable.  |
| NOTE: This application error is only applicable for the responses to the GET, PUT and the DELETE requests. |                           |   |

## 5.7 5GLANParameterProvision API

### 5.7.1 Resources

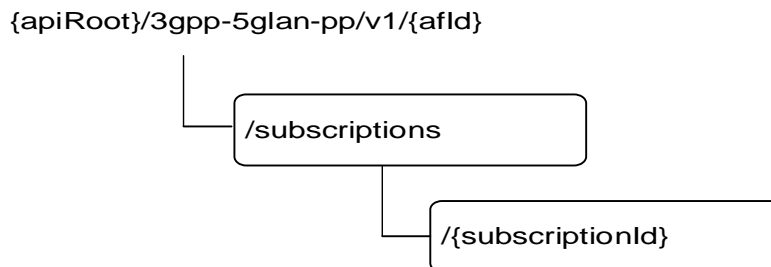
#### 5.7.1.1 Overview

All resource URIs of this API should have the following root:

**{apiRoot}/3gpp-5glan-pp/v1/**

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-5glan-pp" and "apiVersion" shall be set to "v1" for the current version defined in the present document. All resource URIs in the subclauses below are defined relative to the above root URI.

This subclause describes the structure for the Resource URIs as shown in figure 5.7.1.1-1 and the resources and HTTP methods used for the 5GLANParameterProvision API.



**Figure 5.7.1.1-1: Resource URI structure of the 5GLANParameterProvision API**

Table 5.7.1.1-1 provides an overview of the resources and HTTP methods applicable for the 5GLANParameterProvision API.

**Table 5.7.1.1-1: Resources and methods overview**

| Resource name                                      | Resource URI                           | HTTP method | Description   |
|--|--|-------------|---|
| 5GLAN Parameters Provision Subscriptions           | /{afId}/subscriptions                  | GET         | Read all subscriptions for a given AF   |
|  |  | POST        | Create a new subscription to provision parameters                                       |
| Individual 5GLAN Parameters Provision Subscription | /{afId}/subscriptions/{subscriptionId} | GET         | Read an existing subscription identified by {subscriptionId}                            |
|  |  | PUT         | Modify all of the properties of an existing subscription identified by {subscriptionId} |
|  |  | PATCH       | Modify some properties of an existing subscription identified by {subscriptionId}       |
|  |  | DELETE      | Delete a subscription identified by {subscriptionId}                                    |

#### 5.7.1.2 Resource: 5GLAN Parameters Provision Subscriptions

##### 5.7.1.2.1 Introduction

This resource allows a AF to read all active 5GLAN parameters provision subscriptions for the given AF, or create a new individual 5GLAN parameters provision subscription to provision parameters to the NEF.

## 5.7.1.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-5gla-pp/v1/{afId}/subscriptions

This resource shall support the resource URI variables defined in table 5.7.1.2.2-1.

**Table 5.7.1.2.2-1: Resource URI variables for this resource**

| Name    | Data type | Definition                             |
|---------|-----------|--|
| apiRoot | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4]. |
| afId    | string    | Identifier of the AF.                  |

## 5.7.1.2.3 Resource Methods

## 5.7.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.7.1.2.2.

## 5.7.1.2.3.2 GET

The GET method allows to read all active subscriptions for a given AF. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.7.1.2.3.2-1.

**Table 5.7.1.2.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.7.1.2.3.2-2 and the response data structures and response codes specified in table 5.7.1.2.3.2-3.

**Table 5.7.1.2.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.7.1.2.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| array(5GlaParametersProvision)   | M | 0..N        | 200 OK                 | All the subscription information for the AF in the request URI are returned.   |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.7.1.2.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.7.1.2.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

### 5.7.1.2.3.3 POST

The POST method creates a new resource to individual 5GLAN parameters provision subscription for a given AF. The AF shall initiate the HTTP POST request message and the NEF shall respond to the message. The NEF shall construct the URI of the created resource.

This method shall support the request data structures specified in table 5.7.1.2.3.3-1 and the response data structures and response codes specified in table 5.7.1.2.3.3-2.

**Table 5.7.1.2.3.3-1: Data structures supported by the POST Request Body on this resource**

| Data type                | P | Cardinality | Description  |
|--------------------------|---|-------------|--|
| 5GLanParametersProvision | M | 1           | Parameters to create a subscription to provision parameters. |

**Table 5.7.1.2.3.3-2: Data structures supported by the POST Response Body on this resource**

| Data type   | P | Cardinality | Response codes | Description  |
|---|---|-------------|----------------|--|
| 5GLanParametersProvision  | M | 1           | 201 Created    | The subscription was created successfully.<br>The URI of the created resource shall be returned in the "Location" HTTP header. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                |  |

**Table 5.7.1.2.3.3-3: Headers supported by the 201 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description  |
|----------|-----------|---|-------------|--|
| Location | string    | M | 1           | Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-5glan-pp/v1/{afId}/subscriptions/{subscriptionId} |

## 5.7.1.3 Resource: Individual 5GLAN Parameters Provision Subscription

### 5.7.1.3.1 Introduction

This resource allows a AF to read, update or delete an existing subscription to provision 5GLAN parameters.

### 5.7.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-5glan-pp/v1/{afId}/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 5.7.1.3.2-1.



**Table 5.7.1.3.2-1: Resource URI variables for this resource**

| Name           | Data type | Definition                               |
|----------------|-----------|--|
| apiRoot        | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4].   |
| afld           | string    | Identifier of the AF.                    |
| subscriptionId | string    | Identifier of the subscription resource. |

### 5.7.1.3.3 Resource Methods

#### 5.7.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.7.1.3.2.

#### 5.7.1.3.3.2 GET

The GET method allows to read the active subscription for a given AF and subscription Id. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.7.1.3.3.2-1.

**Table 5.7.1.3.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.7.1.3.3.2-2 and the response data structures and response codes specified in table 5.7.1.3.3.2-3.

**Table 5.7.1.3.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.7.1.3.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| 5GLanParametersProvision   | M | 1           | 200 OK                 | The information for the subscription in the request URI are returned.  |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.7.1.3.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.7.1.3.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

#### 5.7.1.3.3.3 PUT

The PUT method modifies an existing resource to update a subscription. The AF shall initiate the HTTP PUT request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.7.1.3.3.3-1 and the response data structures and response codes specified in table 5.7.1.3.3.3-2.

**Table 5.7.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource**

| Data type                | P | Cardinality | Description  |
|--------------------------|---|-------------|--|
| 5GLanParametersProvision | M | 1           | Modify an existing subscription to provision parameters. |

**Table 5.7.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description   |
|--|---|-------------|------------------------|---|
| 5GLanParametersProvision   | M | 1           | 200 OK                 | The subscription was updated successfully.  |
| n/a  |   |             | 204 No Content         | The subscription was updated successfully.  |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |   |

**Table 5.7.1.3.3.3-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.7.1.3.3.3-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

#### 5.7.1.3.3.4 DELETE

The DELETE method deletes an existing individual 5GLAN parameters provision subscription for a given AF. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.7.1.3.3.4-1.

**Table 5.7.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.7.1.3.3.4-2 and the response data structures and response codes specified in table 5.7.1.3.3.4-3.

**Table 5.7.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.7.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource**

| Data type   | P | Cardinality | Response codes         | Description  |
|---|---|-------------|------------------------|--|
| N/A   |   |             | 204 No Content         | The subscription was terminated successfully.  |
| N/A   |   |             | 307 Temporary Redirect | Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A   |   |             | 308 Permanent Redirect | Permanent redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.7.1.3.3.4-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.7.1.3.3.4-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

#### 5.7.1.3.3.5 PATCH

The PATCH method allows to change some properties of an existing resource to update a subscription. The AF shall initiate the HTTP PATCH request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.7.1.3.3.5-1 and the response data structures and response codes specified in table 5.7.1.3.3.5-2.

**Table 5.7.1.3.3.5-1: Data structures supported by the PATCH Request Body on this resource**

| Data type                     | P | Cardinality | Description  |
|-------------------------------|---|-------------|--|
| 5GLanParametersProvisionPatch | M | 1           | Modify an existing subscription to provision parameters. |

**Table 5.7.1.3.3.5-2: Data structures supported by the PATCH Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description   |
|--|---|-------------|------------------------|---|
| 5GLanParametersProvision   | M | 1           | 200 OK                 | The subscription was updated successfully.  |
| n/a  |   |             | 204 No Content         | The subscription was updated successfully.  |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |   |

**Table 5.7.1.3.3.5-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.7.1.3.3.5-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.7.1a Notifications

Notifications are not applicable to this API.

## 5.7.2 Data Model

### 5.7.2.1 General

This subclause specifies the application data model supported by the 5GLANParameterProvision API.

### 5.7.2.2 Reused data types

The data types reused by the 5GLANParameterProvision API from other specifications are listed in table 5.7.2.2-1.

**Table 5.7.2.2-1: Re-used Data Types**

| Data type              | Reference           | Comments   |
|------------------------|---------------------|--|
| ApplicationId          | 3GPP TS 29.571 [8]  |  |
| Dnn                    | 3GPP TS 29.571 [8]  | Identifies a DNN.  |
| ExternalGroupId        | 3GPP TS 29.122 [4]  | External Group Identifier for a user group.  |
| Gpsi                   | 3GPP TS 29.571 [8]  | Identifies a GPSI.   |
| Ipv4Addr               | 3GPP TS 29.571 [8]  | Identifies an IPv4 address.  |
| Ipv6Addr               | 3GPP TS 29.571 [8]  | Identifies an IPv6 address.  |
| Link                   | 3GPP TS 29.122 [4]  | Identifies a referenced resource.  |
| MtcProviderInformation | 3GPP TS 29.571 [8]  | Indicates MTC provider information for 5G VN Group Configuration authorization.        |
| OsId                   | 3GPP TS 29.519 [23] | Operating System.  |
| PduSessionType         | 3GPP TS 29.571 [8]  | PDU session type.  |
| Snssai                 | 3GPP TS 29.571 [8]  | Identifies the S-NSSAI.  |
| SupportedFeatures      | 3GPP TS 29.571 [8]  | Used to negotiate the applicability of the optional features defined in table 5.7.3-1. |

### 5.7.2.3 Structured data types

#### 5.7.2.3.1 Introduction

This clause defines the structured data types to be used in resource representations.

#### 5.7.2.3.2 Type: 5GLanParametersProvision

**Table 5.7.2.3.2-1: Definition of type 5GLanParametersProvision**

| Attribute name | Data type         | P | Cardinality | Description   | Applicability |
|----------------|-------------------|---|-------------|---|---------------|
| self           | Link              | C | 0..1        | Identifies the individual parameters provision subscription resource. Shall be present in the HTTP GET response when reading all the subscriptions for an AF. |               |
| 5gLanParams    | 5GLanParameters   | M | 1           | Represents the 5G LAN service related parameters.   |               |
| suppFeat       | SupportedFeatures | M | 1           | Indicates the negotiated supported features.  |               |

#### 5.7.2.3.3 Type: 5GLanParameters

This type represents the 5G LAN service related parameters need to be provisioned.

Table 5.7.2.3.3-1: Definition of type 5GLanParameters

| Attribute name   | Data type              | P | Cardinality | Description  | Applicability |
|--|------------------------|---|-------------|--|---------------|
| exterGroupld   | ExternalGroupld        | M | 1           | Identifies an 5G Virtual Network Group   |               |
| gpsis  | map(Gpsi)              | M | 1..N        | Represents the list of 5G VN Group members, each member is identified by GPSI  |               |
| dnn  | Dnn                    | M | 1           | DNN for the 5G VN group, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only.                   |               |
| aaalpv4Addr  | Ipv4Addr               | O | 1           | Identifies the DN-AAA server IPv4 address provided by AF, for the secondary authentication/authorization and/or UE IP address allocation by DN-AAA server. |               |
| aaalpv6Addr  | Ipv6Addr               | O | 1           | Identifies the DN-AAA server IPv6 address provided by AF, for the secondary authentication/authorization and/or UE IP address allocation by DN-AAA server. |               |
| aaaUsgs  | array(AaaUsage)        | O | 1..2        | Identifies the usage needs for secondary authentication/authorization and/or UE IP address allocation from the DN-AAA server.                              |               |
| mtcProviderld  | MtcProviderInformation | O | 0..1        | Indicates MTC provider information for 5G VN Group Configuration authorization. (NOTE)   |               |
| snsai  | Snssai                 | M | 1           | S-NSSAI for the 5G VN group  |               |
| sessionType  | PduSessionType         | M | 1           | PDU Session Type allowed for 5G VN group.  |               |
| appDesps   | map(AppDescriptor)     | M | 1..N        | Describes the operation systems and the corresponding applications for each operation systems. The key of map is osld.                                     |               |
| NOTE: The NEF should check received MTC Provider Information and then the NEF may: <ul style="list-style-type: none"> <li>- override it with local configured value and send it to UDM;</li> <li>- send it directly to the UDM; or</li> <li>- reject the 5G VN Group Configuration request.</li> </ul> |                        |   |             |  |               |

## 5.7.2.3.4 Type: AppDescriptor

Table 5.7.2.3.4-1: Definition of type AppDescriptor

| Attribute name | Data type          | P | Cardinality | Description   | Applicability |
|----------------|--------------------|---|-------------|---|---------------|
| osld           | Osld               | M | 1           | Identifies an operating system supported by the UE                    |               |
| applds         | map(Applicationld) | M | 1..N        | Identifies applications that is running on the UE's operating system. |               |

## 5.7.2.3.5 Type: 5GLanParametersProvisionPatch

**Table 5.7.2.3.5-1: Definition of type 5GLanParametersProvisionPatch**

| Attribute name   | Data type            | P | Cardinality | Description  | Applicability |
|------------------|----------------------|---|-------------|--|---------------|
| 5gLanParamsPatch | 5GLanParametersPatch | O | 0..1        | Represents the 5G LAN service related parameters.<br><br>This attribute is deprecated. The "5gLanParams" attribute should be used instead. |               |
| 5gLanParams      | 5GLanParameters      | O | 0..1        | Represents the updated 5G LAN service related parameters.  |               |

## 5.7.2.3.6 Type: 5GLanParametersPatch

This data type is deprecated.

**Table 5.7.2.3.6-1: Definition of type 5GLanParametersPatch**

| Attribute name | Data type            | P | Cardinality | Description  | Applicability |
|----------------|----------------------|---|-------------|--|---------------|
| gpsis          | map(GpsiRm)          | O | 1..N        | Represents the list of 5G VN Group members, each member is identified by GPSI  |               |
| appDesps       | map(AppDescriptorRm) | O | 1..N        | Describes the operation systems and the corresponding applications for each operation system.<br>The key of map is osld. |               |

## 5.7.2.3.7 Type: AppDescriptorRm

**Table 5.7.2.3.7-1: Definition of type AppDescriptorRm**

| Attribute name | Data type            | P | Cardinality | Description   | Applicability |
|----------------|----------------------|---|-------------|---|---------------|
| applds         | map(ApplicationIdRm) | O | 1..N        | Identifies application(s) on the UE's operating system. |               |

## 5.7.2.3.8 Enumeration: AaaUsage

**Table 5.7.2.3.8-1: Enumeration DnAaaIndicator**

The enumeration AaaUsage represents the usage of the DN-AAA server.

| Enumeration value | Description   |
|-------------------|---|
| "AUTH"            | Secondary authentication/authorization by DN-AAA server |
| "IP_ALLOC"        | UE IP address allocation by DN-AAA server               |

## 5.7.2.4 Simple data types and enumerations

## 5.7.2.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

### 5.7.2.4.2 Simple data types

The simple data types defined in table 5.7.2.4.2-1 shall be supported.

**Table 5.7.2.4.2-1: Simple data types**

| Type Name | Type Definition | Description | Applicability |
|-----------|-----------------|-------------|---------------|
|           |                 |             |               |

## 5.7.3 Used Features

The table below defines the features applicable to the 5GLANParameterProvision API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

**Table 5.7.3-1: Features used by 5GLANParameterProvision API**

| Feature number | Feature Name | Description |
|----------------|--------------|-------------|
|                |              |             |

## 5.8 ApplyingBdtPolicy API

### 5.8.1 Resources

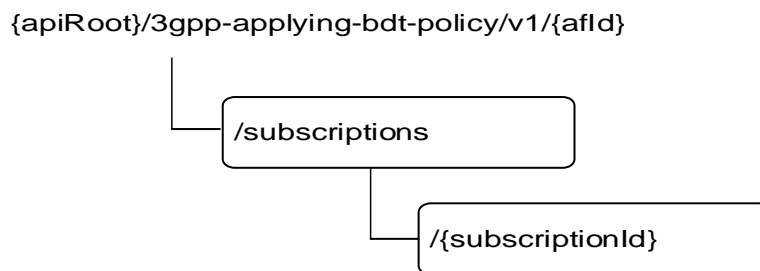
#### 5.8.1.1 Overview

All resource URIs of this API should have the following root:

**{apiRoot}/3gpp-applying-bdt-policy/v1/**

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-applying-bdt-policy" and "apiVersion" shall be set to "v1" for the current version defined in the present document. All resource URIs in the subclauses below are defined relative to the above root URI.

This subclause describes the structure for the Resource URIs as shown in figure 5.8.1.1-1 and the resources and HTTP methods used for the ApplyingBdtPolicy API.



**Figure 5.8.1.1-1: Resource URI structure of the ApplyingBdtPolicy API**

Table 5.8.1.1-1 provides an overview of the resources and HTTP methods applicable for the ApplyingBdtPolicy API.



**Table 5.8.1.1-1: Resources and methods overview**

| Resource name                              | Resource URI                           | HTTP method | Description  |
|--|--|-------------|--|
| Applied BDT Policy Subscriptions           | /{afld}/subscriptions                  | GET         | Read all applied BDT policy subscriptions for a given AF.            |
|  |  | POST        | Create a new applied policy subscription.                            |
| Individual Applied BDT Policy Subscription | /{afld}/subscriptions/{subscriptionId} | GET         | Read an applied BDT policy subscription.                             |
|  |  | PATCH       | Modify BDT Reference ID of an existing subscription to a BDT policy. |
|  |  | DELETE      | Delete an applied BDT policy subscription                            |

## 5.8.1.2 Resource: Applied BDT Policy Subscriptions

### 5.8.1.2.1 Introduction

This resource allows a AF to read all applied BDT policy subscriptions for the given AF.

### 5.8.1.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-applying-bdt-policy/v1/{afld}/subscriptions

This resource shall support the resource URI variables defined in table 5.8.1.2.2-1.

**Table 5.8.1.2.2-1: Resource URI variables for this resource**

| Name    | Data type | Definition                             |
|---------|-----------|--|
| apiRoot | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4]. |
| afld    | string    | Identifier of the AF.                  |

### 5.8.1.2.3 Resource Methods

#### 5.8.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.8.1.2.2.

#### 5.8.1.2.3.2 GET

The GET method allows to read all active applied BDT policy subscriptions for a given AF. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.8.1.2.3.2-1.

**Table 5.8.1.2.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.8.1.2.3.2-2 and the response data structures and response codes specified in table 5.8.1.2.3.2-3.

**Table 5.8.1.2.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.8.1.2.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| array(AppliedBdt Policy)   | M | 0..N        | 200 OK                 | The applied BDT Policy subscriptions for the AF in the request URI are returned.   |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.8.1.2.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.8.1.2.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

### 5.8.1.2.3.3 POST

The POST method creates an applied BDT policy subscription for a given AF. The AF shall initiate the HTTP POST request message and the NEF shall respond to the message. The NEF shall construct the URI of the created resource.

This method shall support the request data structures specified in table 5.8.1.2.3.3-1 and the response data structures and response codes specified in table 5.8.1.2.3.3-2.

**Table 5.8.1.2.3.3-1: Data structures supported by the POST Request Body on this resource**

| Data type        | P | Cardinality | Description  |
|------------------|---|-------------|--|
| AppliedBdtPolicy | M | 1           | Parameters to create a subscription of the applied BDT policy. |

**Table 5.8.1.2.3.3-2: Data structures supported by the POST Response Body on this resource**

| Data type        | P | Cardinality | Response codes | Description  |
|------------------|---|-------------|----------------|--|
| AppliedBdtPolicy | M | 1           | 201 Created    | The subscription was created successfully.<br>The URI of the created resource shall be returned in the "Location" HTTP header. |

NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

**Table 5.8.1.2.3.3-3: Headers supported by the 201 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-applying-bdt-policy/v1/{afId}/subscriptions/{SubscriptionId} |

### 5.8.1.3 Resource: Individual Applied BDT Policy Subscription

#### 5.8.1.3.1 Introduction

This resource allows a AF to read or delete an active subscription of applied BDT policy.

#### 5.8.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-applying-bdt-policy/v1/{afId}/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 5.8.1.3.2-1.

**Table 5.8.1.3.2-1: Resource URI variables for this resource**

| Name           | Data type | Definition                               |
|----------------|-----------|--|
| apiRoot        | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4].   |
| afId           | string    | Identifier of the AF.                    |
| subscriptionId | string    | Identifier of the subscription resource. |

#### 5.8.1.3.3 Resource Methods

##### 5.8.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.8.1.3.2.

##### 5.8.1.3.3.2 GET

The GET method allows to read the active applied BDT policy for a given AF and subscription Id. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.8.1.3.3.2-1.

**Table 5.8.1.3.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.8.1.3.3.2-2 and the response data structures and response codes specified in table 5.8.1.3.3.2-3.

**Table 5.8.1.3.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.8.1.3.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| AppliedBdtPolicy   | M | 1           | 200 OK                 | The subscription information for the AF in the request URI are returned.   |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.8.1.3.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.8.1.3.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

### 5.8.1.3.3.3 PATCH

The PATCH method allows to change some properties of an existing applied BDT policy subscription. The AF shall initiate the HTTP PATCH request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.8.1.3.3.3-1 and the response data structures and response codes specified in table 5.8.1.3.3.3-2.

**Table 5.8.1.3.3.3-1: Data structures supported by the PATCH Request Body on this resource**

| Data type             | P | Cardinality | Description   |
|-----------------------|---|-------------|---|
| AppliedBdtPolicyPatch | M | 1           | Partial update of a subscription to applying BDT policy subscription. |

**Table 5.8.1.3.3.3-2: Data structures supported by the PATCH Response Body on this resource**

| Data type        | P | Cardinality | Response codes         | Description   |
|------------------|---|-------------|------------------------|---|
| AppliedBdtPolicy | M | 1           | 200 OK                 | The subscription was modified successfully.   |
| n/a              |   |             | 204 No Content         | The subscription was modified successfully.   |
| N/A              |   |             | 307 Temporary Redirect | Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |

|  |  |  |                              |   |
|--|--|--|------------------------------|---|
| N/A  |  |  | 308<br>Permanent<br>Redirect | Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |  |  |                              |   |

**Table 5.8.1.3.3.3-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.8.1.3.3.3-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

#### 5.8.1.3.3.4 DELETE

The DELETE method deletes an existing applied BDT policy subscription for a given AF. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.8.1.3.3.4-1.

**Table 5.8.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.8.1.3.3.4-2 and the response data structures and response codes specified in table 5.8.1.3.3.4-3.

**Table 5.8.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.8.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource**

| Data type   | P | Cardinality | Response codes         | Description  |
|---|---|-------------|------------------------|--|
| N/A   |   |             | 204 No Content         | The subscription was terminated successfully.  |
| N/A   |   |             | 307 Temporary Redirect | Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A   |   |             | 308 Permanent Redirect | Permanent redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.8.1.3.3.4-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.8.1.3.3.4-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.8.2 Notifications

Notifications are not applicable to this API.

## 5.8.3 Data Model

### 5.8.3.1 General

This subclause specifies the application data model supported by the ApplyingBdtPolicy API.

### 5.8.3.2 Reused data types

The data types reused by the ApplyingBdtPolicy API from other specifications are listed in table 5.8.3.2-1.

**Table 5.8.3.2-1: Re-used Data Types**

| Data type         | Reference          | Comments   |
|-------------------|--------------------|--|
| BdtReferenceld    | 3GPP TS 29.122 [4] | Identifier of a selected BDT policy.   |
| Gpsi              | 3GPP TS 29.571 [8] | Identifies a GPSI.   |
| ExternalGroupld   | 3GPP TS 29.122 [4] | External Group Identifier for a user group.  |
| SupportedFeatures | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features defined in table 5.8.4-1. |

### 5.8.3.3 Structured data types

#### 5.8.3.3.1 Introduction

This clause defines the structured data types to be used in resource representations.

#### 5.8.3.3.2 Type: AppliedBdtPolicy

This type represents an applied BDT policy which is sent from the AF to the NEF.

**Table 5.8.3.3.2-1: Definition of type AppliedBdtPolicy**

| Attribute name  | Data type         | P | Cardinality | Description   | Applicability (NOTE) |
|---|-------------------|---|-------------|---|----------------------|
| bdtRefId  | BdtReferenceld    | M | 1           | Identifies a selected policy of background data transfer.   |                      |
| gpsi  | Gpsi              | C | 0..1        | Identifies a user.  |                      |
| externalGroupId   | ExternalGroupId   | C | 0..1        | Identifies a user group.  |                      |
| supFeat   | SupportedFeatures | M | 1           | Indicates the list of Supported features used as described in subclause 5.8.4. This attribute shall be provided in the POST request and in the response of successful resource creation |                      |
| self  | Link              | C | 0..1        | Identifies the Individual Applied BDT Policy Subscription resource. Shall be present in the HTTP GET response when reading all the subscriptions for an AF.                             |                      |
| NOTE: Only one of the properties "gpsi" or "externalGroupId" shall be included. |                   |   |             |   |                      |

**5.8.3.3.3 Type: AppliedBdtPolicyPatch**

This type represents a subscription of applied BDT policy parameters provided by the AF to the NEF. The structure is used for HTTP PATCH request.

**Table 5.8.3.3.2-1: Definition of type AppliedBdtPolicyPatch**

| Attribute name | Data type      | P | Cardinality | Description   | Applicability |
|----------------|----------------|---|-------------|---|---------------|
| bdtRefId       | BdtReferenceld | M | 1           | Identifies a selected policy of background data transfer. |               |

**5.8.3.4 Simple data types and enumerations**

**5.8.3.4.1 Introduction**

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

**5.8.3.4.2 Simple data types**

The simple data types defined in table 5.8.3.4.2-1 shall be supported.

**Table 5.8.3.4.2-1: Simple data types**

| Type Name | Type Definition | Description | Applicability |
|-----------|-----------------|-------------|---------------|
|           |                 |             |               |

**5.8.4 Used Features**

The table below defines the features applicable to the ApplyingBdtPolicy API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

**Table 5.8.4-1: Features used by ApplyingBdtPolicy API**

| Feature number | Feature Name | Description |
|----------------|--------------|-------------|
|                |              |             |

## 5.9 IPTVConfiguration API

### 5.9.1 Resources

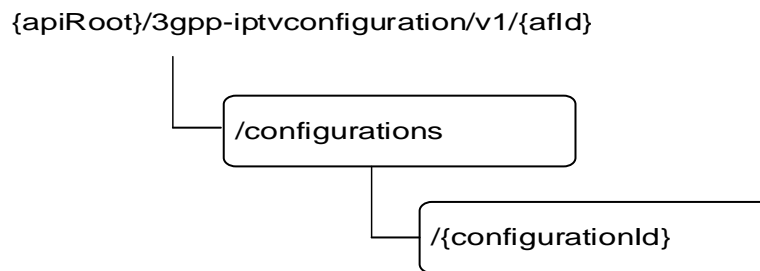
#### 5.9.1.1 Overview

All resource URIs of this API should have the following root:

**{apiRoot}/3gpp-iptvconfiguration/v1/**

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-iptvconfiguration" and "apiVersion" shall be set to "v1" for the current version defined in the present document. All resource URIs in the subclauses below are defined relative to the above root URI.

This subclause describes the structure for the Resource URIs as shown in figure 5.9.1.1-1 and the resources and HTTP methods used for the IPTVConfiguration API.



**Figure 5.9.1.1-1: Resource URI structure of the IPTVConfiguration API**

Table 5.9.1.1-1 provides an overview of the resources and HTTP methods applicable for the IPTVConfiguration API.

**Table 5.9.1.1-1: Resources and methods overview**

| Resource name                 | Resource URI                             | HTTP method | Description  |
|-------------------------------|--|-------------|--|
| IPTV Configurations           | /{afld}/configurations                   | GET         | Read all configurations for a given AF   |
|                               |  | POST        | Create a new IPTV configuration  |
| Individual IPTV Configuration | /{afld}/configurations/{configurationId} | GET         | Read an existing configuration identified by {configurationId}                             |
|                               |  | PUT         | Modify all of the properties of an existing configuration identified by {configurationId}  |
|                               |  | PATCH       | Modify some of the properties of an existing configuration identified by {configurationId} |
|                               |  | DELETE      | Delete a configuration identified by {configurationId}                                     |



## 5.9.1.2 Resource: IPTV Configurations

### 5.9.1.2.1 Introduction

This resource allows a AF to read all active IPTV configurations for the given AF, or create an new individual IPTV configuration in the NEF.

### 5.9.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-iptvconfiguration/v1/{afId}/configurations**

This resource shall support the resource URI variables defined in table 5.9.1.2.2-1.

**Table 5.9.1.2.2-1: Resource URI variables for this resource**

| Name    | Data type | Definition                             |
|---------|-----------|--|
| apiRoot | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4]. |
| afId    | string    | Identifier of the AF.                  |

### 5.9.1.2.3 Resource Methods

#### 5.9.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.9.1.2.2.

#### 5.9.1.2.3.2 GET

The GET method allows to read all active configurations for a given AF. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.9.1.2.3.2-1.

**Table 5.9.1.2.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.9.1.2.3.2-2 and the response data structures and response codes specified in table 5.9.1.2.3.2-3.

**Table 5.9.1.2.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.9.1.2.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| array(IptvConfigData)  | M | 0..N        | 200 OK                 | All the configuration information for the AF in the request URI are returned.  |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.9.1.2.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.9.1.2.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

### 5.9.1.2.3.3 POST

The POST method creates a new resource to individual IPTV configuration for a given AF. The AF shall initiate the HTTP POST request message and the NEF shall respond to the message. The NEF shall construct the URI of the created resource.

This method shall support the request data structures specified in table 5.9.1.2.3.3-1 and the response data structures and response codes specified in table 5.9.1.2.3.3-2.

**Table 5.9.1.2.3.3-1: Data structures supported by the POST Request Body on this resource**

| Data type      | P | Cardinality | Description  |
|----------------|---|-------------|--|
| IptvConfigData | M | 1           | Parameters to create an IPTV Configuration resource. |

**Table 5.9.1.2.3.3-2: Data structures supported by the POST Response Body on this resource**

| Data type   | P | Cardinality | Response codes | Description  |
|---|---|-------------|----------------|--|
| IptvConfigData  | M | 1           | 201 Created    | The configuration resource was created successfully.<br>The URI of the created resource shall be returned in the "Location" HTTP header. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                |  |

**Table 5.9.1.2.3.3-3: Headers supported by the 201 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-iptvconfiguration/v1/{afId}/configurations/{configurationId} |

### 5.9.1.3 Resource: Individual IPTV Configuration

#### 5.9.1.3.1 Introduction

This resource allows a AF to read, update or delete an existing IPTV Configuration.

#### 5.9.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-iptvconfiguration/v1/{afId}/configurations/{configurationId}

This resource shall support the resource URI variables defined in table 5.9.1.3.2-1.

**Table 5.9.1.3.2-1: Resource URI variables for this resource**

| Name            | Data type | Definition                                |
|-----------------|-----------|---|
| apiRoot         | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4].    |
| afId            | string    | Identifier of the AF.                     |
| configurationId | string    | Identifier of the configuration resource. |

#### 5.9.1.3.3 Resource Methods

##### 5.9.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.9.1.3.2.

##### 5.9.1.3.3.2 GET

The GET method allows to read the active configuration for a given AF and subscription Id. The AF shall initiate the HTTP GET request message and theNEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.9.1.3.3.2-1.

**Table 5.9.1.3.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.9.1.3.3.2-2 and the response data structures and response codes specified in table 5.9.1.3.3.2-3.

**Table 5.9.1.3.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.9.1.3.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type      | P | Cardinality | Response codes | Description  |
|----------------|---|-------------|----------------|--|
| IptvConfigData | M | 1           | 200 OK         | The information for the configuration in the request URI are returned. |

|  |  |  |                              |  |
|--|--|--|------------------------------|--|
| N/A  |  |  | 307<br>Temporary<br>Redirect | Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |  |  | 308<br>Permanent<br>Redirect | Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |  |  |                              |  |

**Table 5.9.1.3.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.9.1.3.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

#### 5.9.1.3.3.3 PUT

The PUT method modifies an existing resource to update a configuration. The AF shall initiate the HTTP PUT request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.9.1.3.3.3-1 and the response data structures and response codes specified in table 5.9.1.3.3.3-2.

**Table 5.9.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource**

| Data type      | P | Cardinality | Description                       |
|----------------|---|-------------|-----------------------------------|
| IptvConfigData | M | 1           | Modify an existing configuration. |

**Table 5.9.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource**

| Data type  | P | Cardinality | Response codes               | Description   |
|--|---|-------------|------------------------------|---|
| IptvConfigData   | M | 1           | 200 OK                       | The configuration resource was updated successfully.  |
| n/a  |   |             | 204 No Content               | The configuration resource was updated successfully.  |
| N/A  |   |             | 307<br>Temporary<br>Redirect | Temporary redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308<br>Permanent<br>Redirect | Permanent redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                              |   |

**Table 5.9.1.3.3.3-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.9.1.3.3.3-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

#### 5.9.1.3.3.4 DELETE

The DELETE method deletes an existing individual configuration for a given AF. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.9.1.3.3.4-1.

**Table 5.9.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.9.1.3.3.4-2 and the response data structures and response codes specified in table 5.9.1.3.3.4-3.

**Table 5.9.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.9.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource**

| Data type   | P | Cardinality | Response codes         | Description  |
|---|---|-------------|------------------------|--|
| N/A   |   |             | 204 No Content         | The configuration resource was terminated successfully.  |
| N/A   |   |             | 307 Temporary Redirect | Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A   |   |             | 308 Permanent Redirect | Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.9.1.3.3.4-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.9.1.3.3.4-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

### 5.9.1.3.3.5 PATCH

The PATCH method allows to change some properties of an existing resource to update a configuration. The AF shall initiate the HTTP PATCH request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.9.1.3.3.5-1 and the response data structures and response codes specified in table 5.9.1.3.3.5-2.

**Table 5.9.1.3.3.5-1: Data structures supported by the PATCH Request Body on this resource**

| Data type           | P | Cardinality | Description                               |
|---------------------|---|-------------|---|
| IptvConfigDataPatch | M | 1           | Partial update an existing configuration. |

**Table 5.9.1.3.3.5-2: Data structures supported by the PATCH Response Body on this resource**

| Data type      | P | Cardinality | Response codes         | Description   |
|----------------|---|-------------|------------------------|---|
| IptvConfigData | M | 1           | 200 OK                 | The configuration resource was updated successfully.  |
| n/a            |   |             | 204 No Content         | The configuration resource was updated successfully.  |
| N/A            |   |             | 307 Temporary Redirect | Temporary redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A            |   |             | 308 Permanent Redirect | Permanent redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |

NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

**Table 5.9.1.3.3.5-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.9.1.3.3.5-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.9.1A Notifications

Notifications are not applicable to this API.

## 5.9.2 Data Model

### 5.9.2.1 General

This subclause specifies the application data model supported by the IPTVConfiguration API.

### 5.9.2.2 Reused data types

The data types reused by the IPTVConfiguration API from other specifications are listed in table 5.9.2.2-1.

**Table 5.9.2.2-1: Re-used Data Types**

| Data type              | Reference          | Comments   |
|------------------------|--------------------|--|
| Dnn                    | 3GPP TS 29.571 [8] | Identifies a DNN.  |
| ExternalGroupld        | 3GPP TS 29.122 [4] | External Group Identifier for a user group.  |
| Gpsi                   | 3GPP TS 29.571 [8] | Identifies a GPSI.   |
| Ipv4Addr               | 3GPP TS 29.571 [8] | Identifies an IPv4 address.  |
| Ipv6Addr               | 3GPP TS 29.571 [8] | Identifies an IPv6 address.  |
| Link                   | 3GPP TS 29.122 [4] |  |
| MtcProviderInformation | 3GPP TS 29.571 [8] | Indicates MTC provider information.  |
| Snssai                 | 3GPP TS 29.571 [8] | Identifies the S-NSSAI.  |
| SupportedFeatures      | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features defined in table 5.9.3-1. |

### 5.9.2.3 Structured data types

#### 5.9.2.3.1 Introduction

This clause defines the structured data types to be used in resource representations.

#### 5.9.2.3.2 Type: IptvConfigData

**Table 5.9.2.3.2-1: Definition of type IptvConfigData**

| Attribute name | Data type                   | P | Cardinality | Description   | Applicability |
|----------------|-----------------------------|---|-------------|---|---------------|
| self           | Link                        | C | 0..1        | Identifies the individual IPTV configuration resource URI. Shall be present in the HTTP GET response when reading all the configurations for an AF. |               |
| gpsi           | Gpsi                        | C | 0..1        | Identifies GPSI.(NOTE)  |               |
| exterGroupld   | ExternalGroupld             | C | 0..1        | Represents a group of users. (NOTE)   |               |
| afAppld        | string                      | M | 1           | Identifies an application.  |               |
| dnn            | Dnn                         | O | 0..1        | Identifies a DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only.                   |               |
| snssai         | Snssai                      | O | 0..1        | Identifies an S-NSSAI.  |               |
| multiAccCtrls  | map(MulticastAccessControl) | M | 1..N        | Identifies a list of multicast address access control information.  |               |
| mtcProviderld  | MtcProviderInformation      | O | 0..1        | Indicates MTC provider information.   |               |
| suppFeat       | SupportedFeatures           | M | 1           | Indicates the negotiated supported features.  |               |

NOTE: Only one of the "gpsi" or "exterGroupld" attribute shall be provided.

5.9.2.3.3 Type: MulticastAccessControl

**Table 5.9.2.3.3-1: Definition of type MulticastAccessControl**

| Attribute name  | Data type         | P | Cardinality | Description  | Applicability |
|---|-------------------|---|-------------|--|---------------|
| srcIpv4Addr   | Ipv4Addr          | O | 0..1        | Identifies the source IPv4 address of IPTV multicast channel.              |               |
| srcIpv6Addr   | Ipv6Addr          | O | 0..1        | Identifies the source IPv6 address of IPTV multicast channel.              |               |
| multicastV4Addr   | Ipv4Addr          | O | 0..1        | Identifies the multicast IPv4 address of IPTV multicast channel.<br>(NOTE) |               |
| multicastV6Addr   | Ipv6Addr          | O | 0..1        | Identifies the multicast IPv6 address of IPTV multicast channel.<br>(NOTE) |               |
| accStatus   | AccessRightStatus | M | 1           | Represents access right status of the multicast channel.                   |               |
| NOTE: At least one of the "multicastV4Addr" or "multicastV6Addr" attribute shall be provided. |                   |   |             |  |               |

5.9.2.3.4 Type: IptvConfigDataPatch

**Table 5.9.2.3.4-1: Definition of type IptvConfigDataPatch**

| Attribute name | Data type                   | P | Cardinality | Description  | Applicability |
|----------------|-----------------------------|---|-------------|--|---------------|
| multiAccCtrls  | map(MulticastAccessControl) | O | 1..N        | Identifies a list of multicast address access control information. |               |

5.9.2.4 Simple data types and enumerations

5.9.2.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

5.9.2.4.2 Simple data types

The simple data types defined in table 5.9.2.4.2-1 shall be supported.

**Table 5.9.2.4.2-1: Simple data types**

| Type Name | Type Definition | Description | Applicability |
|-----------|-----------------|-------------|---------------|
|           |                 |             |               |

5.9.2.4.3 Enumeration: AccessRightStatus

The enumeration AccessRightStatus represents the parameters provision type of which the AF requests to provision. It shall comply with the provisions defined in table 5.9.2.4.3-1.



**Table 5.9.2.4.3-1: Enumeration ProvisionType**

| Enumeration value | Description   |
|-------------------|---|
| FULLY_ALLOWED     | The User is fully allowed to access to the channel.   |
| PREVIEW_ALLOWED   | The User is preview allowed to access to the channel. |
| NO_ALLOWED        | The User is not allowed to access to the channel.     |

### 5.9.3 Used Features

The table below defines the features applicable to the IPTVConfiguration API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

**Table 5.9.3-1: Features used by IPTVConfiguration API**

| Feature number | Feature Name | Description |
|----------------|--------------|-------------|
|                |              |             |

## 5.10 LpiParameterProvision API

### 5.10.1 Resources

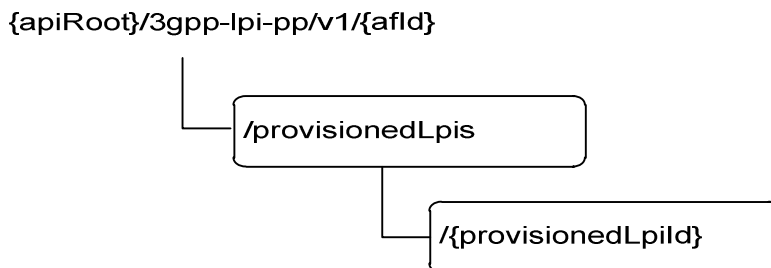
#### 5.10.1.1 Overview

All resource URIs of this API should have the following root:

**{apiRoot}/3gpp-lpi-pp/v1/**

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-lpi-pp" and "apiVersion" shall be set to "v1" for the current version defined in the present document. All resource URIs in the subclauses below are defined relative to the above root URI.

This subclause describes the structure for the Resource URIs as shown in figure 5.10.1.1-1 and the resources and HTTP methods used for the LpiParameterProvision API.



**Figure 5.10.1.1-1: Resource URI structure of the LpiParameterProvision API**

Table 5.10.1.1-1 provides an overview of the resources and HTTP methods applicable for the LpiParameterProvision API.

**Table 5.10.1.1-1: Resources and methods overview**

| Resource name                          | Resource URI                               | HTTP method | Description  |
|--|--|-------------|--|
| LPI Parameters Provisionings           | /{afld}/provisionedLpis                    | GET         | Read all LPI Parameters Provisioning resources for a given AF  |
|  |  | POST        | Create a new Individual LPI Parameters Provisioning resource   |
| Individual LPI Parameters Provisioning | /{afld}/provisionedLpis/{provisionedLpild} | GET         | Read an existing Individual LPI Parameters Provisioning resource identified by {provisionedLpild}                            |
|  |  | PUT         | Modify all of the properties of an existing Individual LPI Parameters Provisioning resource identified by {provisionedLpild} |
|  |  | DELETE      | Delete an existing Individual LPI Parameters Provisioning resource identified by {provisionedLpild}                          |

## 5.10.1.2 Resource: LPI Parameters Provisionings

### 5.10.1.2.1 Introduction

This resource allows a AF to read all active LPI Parameters Provisionings for the given AF, or create an new individual LPI Parameters Provisioning resource to provision parameters to the NEF.

### 5.10.1.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-lpi-pp/v1/{afld}/provisionedLpis

This resource shall support the resource URI variables defined in table 5.10.1.2.2-1.

**Table 5.10.1.2.2-1: Resource URI variables for this resource**

| Name    | Data type | Definition                             |
|---------|-----------|--|
| apiRoot | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4]. |
| afld    | string    | Identifier of the AF.                  |

### 5.10.1.2.3 Resource Methods

#### 5.10.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.10.1.2.3.

#### 5.10.1.2.3.2 GET

The GET method allows to read all active LPI Parameters Provisioning resources for a given AF. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.10.1.2.3.2-1.

**Table 5.10.1.2.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.10.1.2.3.2-2 and the response data structures and response codes specified in table 5.10.1.2.3.2-3.

**Table 5.10.1.2.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.10.1.2.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| array(LpiParametersProvisioning)   | M | 0..N        | 200 OK                 | All the LPI Parameters Provisioning information for the AF in the request URI are returned.  |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.10.1.2.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.10.1.2.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

### 5.10.1.2.3.3 POST

The POST method creates a new resource to LPI Parameters Provisionings for a given AF. The AF shall initiate the HTTP POST request message and the NEF shall respond to the message. The NEF shall construct the URI of the created resource.

This method shall support the request data structures specified in table 5.10.1.2.3.3-1 and the response data structures and response codes specified in table 5.10.1.2.3.3-2.

**Table 5.10.1.2.3.3-1: Data structures supported by the POST Request Body on this resource**

| Data type                 | P | Cardinality | Description  |
|---------------------------|---|-------------|--|
| LpiParametersProvisioning | M | 1           | Parameters to create an Individual LPI Parameters Provisioning resource to provision parameters. |

**Table 5.10.1.2.3.3-2: Data structures supported by the POST Response Body on this resource**

| Data type   | P | Cardinality | Response codes | Description  |
|---|---|-------------|----------------|--|
| LpiParametersProvision  | M | 1           | 201<br>Created | The resource was created successfully.<br>The URI of the created resource shall be returned in the "Location" HTTP header. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                |  |

**Table 5.10.1.2.3.3-3: Headers supported by the 201 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description  |
|----------|-----------|---|-------------|--|
| Location | string    | M | 1           | Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-lpi-pp/v1/{afld}/provisionedLpis/{provisionedLpild} |

### 5.10.1.3 Resource: Individual LPI Parameters Provisioning

#### 5.10.1.3.1 Introduction

This resource allows a AF to read, update or delete an existing Individual LPI Parameters Provisioning resource.

#### 5.10.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-lpi-pp/v1/{afld}/provisionedLpis/{provisionedLpiId}

This resource shall support the resource URI variables defined in table 5.10.1.3.2-1.

**Table 5.10.1.3.2-1: Resource URI variables for this resource**

| Name             | Data type | Definition                               |
|------------------|-----------|--|
| apiRoot          | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4].   |
| afld             | string    | Identifier of the AF.                    |
| provisionedLpild | string    | Identifier of the provisioning resource. |

#### 5.10.1.3.3 Resource Methods

##### 5.10.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.10.1.3.3.

##### 5.10.1.3.3.2 GET

The GET method allows to read an active Individual LPI Parameters Provisioning resource for a given AF and provisionedLpiId. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.10.1.3.3.2-1.

**Table 5.10.1.3.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.10.1.3.3.2-2 and the response data structures and response codes specified in table 5.10.1.3.3.2-3.

**Table 5.10.1.3.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.10.1.3.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| LpiParametersProvision   | M | 1           | 200 OK                 | The information for the source in the request URI are returned.  |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.10.1.3.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.10.1.3.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

### 5.10.1.3.3.3 PUT

The PUT method modifies an existing resource to update an existing Individual LPI Parameters Provisioning resource. The AF shall initiate the HTTP PUT request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.10.1.3.3.3-1 and the response data structures and response codes specified in table 5.10.1.3.3.3-2.

**Table 5.10.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource**

| Data type              | P | Cardinality | Description   |
|------------------------|---|-------------|---|
| LpiParametersProvision | M | 1           | Modify an existing individual LPI Parameters Provisioning resource to provision parameters. |

**Table 5.10.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource**

| Data type              | P | Cardinality | Response codes | Description                            |
|------------------------|---|-------------|----------------|--|
| LpiParametersProvision | M | 1           | 200 OK         | The resource was updated successfully. |

|  |  |  |                        |   |
|--|--|--|------------------------|---|
| N/A  |  |  | 204 No Content         | The resource was updated successfully and no additional content is sent in the response message.  |
| N/A  |  |  | 307 Temporary Redirect | Temporary redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |  |  | 308 Permanent Redirect | Permanent redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |  |  |                        |   |

**Table 5.10.1.3.3.3-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.10.1.3.3.3-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

#### 5.10.1.3.3.4 DELETE

The DELETE method deletes an existing individual LPI Parameters Provisioning resource for a given AF. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.10.1.3.3.4-1.

**Table 5.10.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.10.1.3.3.4-2 and the response data structures and response codes specified in table 5.10.1.3.3.4-3.

**Table 5.10.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.10.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource**

| Data type | P | Cardinality | Response codes         | Description  |
|-----------|---|-------------|------------------------|--|
| N/A       |   |             | 204 No Content         | The resource was removed successfully.   |
| N/A       |   |             | 307 Temporary Redirect | Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |

|   |  |  |                              |  |
|---|--|--|------------------------------|--|
| N/A   |  |  | 308<br>Permanent<br>Redirect | Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |  |  |                              |  |

**Table 5.10.1.3.3.4-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.10.1.3.3.4-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.10.2 Data Model

### 5.10.2.1 General

This subclause specifies the application data model supported by the LpiParameterProvision API.

### 5.10.2.2 Reused data types

The data types reused by the LpiParameterProvision API from other specifications are listed in table 5.10.2.2-1.

**Table 5.10.2.2-1: Re-used Data Types**

| Data type              | Reference           | Comments  |
|------------------------|---------------------|---|
| ExternalGroupId        | 3GPP TS 29.122 [4]  | External Group Identifier for a user group.   |
| Gpsi                   | 3GPP TS 29.571 [8]  | Identifies a GPSI.  |
| Link                   | 3GPP TS 29.122 [4]  | Identifies a referenced resource.   |
| Lpi                    | 3GPP TS 29.503 [17] | Identifies the Location Privacy Indication information.                                   |
| MtcProviderInformation | 3GPP TS 29.571 [8]  | Indicates MTC provider information for LCS privacy parameter configuration authorization. |
| SupportedFeatures      | 3GPP TS 29.571 [8]  | Used to negotiate the applicability of the optional features defined in table 5.10.3-1.   |

### 5.10.2.3 Structured data types

#### 5.10.2.3.1 Introduction

This clause defines the structured data types to be used in resource representations.

5.10.2.3.2 Type: LpiParametersProvision

**Table 5.10.2.3.2-1: Definition of type LpiParametersProvision**

| Attribute name  | Data type              | P | Cardinality | Description  | Applicability |
|---|------------------------|---|-------------|--|---------------|
| self  | Link                   | C | 0..1        | Identifies the individual parameters provisioning resource. This attribute shall be supplied by the NEF in HTTP responses that include an object of LpiParametersProvision type. |               |
| exterGroupId  | ExternalGroupId        | O | 0..1        | Identifies a group of UEs. (NOTE 1)  |               |
| gpsi  | Gpsi                   | O | 0..1        | Identifies an UE with GPSI. (NOTE 1)   |               |
| lpi   | Lpi                    | M | 1           | Location Privacy Indication parameters   |               |
| mtcProviderId   | MtcProviderInformation | O | 0..1        | Indicates MTC provider information for LCS privacy parameter configuration authorization. (NOTE 2)   |               |
| supFeat   | SupportedFeatures      | M | 1           | Indicates the negotiated supported features.   |               |
| NOTE 1: Only one of the "gpsi" or "exterGroupId" attribute shall be provided.   |                        |   |             |  |               |
| NOTE 2: The NEF should check received MTC Provider Id information and then the NEF may:<br>- override it with local configured value and send it to UDM;<br>- send it directly to the UDM; or<br>- reject the LPI Parameter Provisioning request. |                        |   |             |  |               |

5.10.2.4 Simple data types and enumerations

5.10.2.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

5.10.2.4.2 Simple data types

The simple data types defined in table 5.10.2.4.2-1 shall be supported.

**Table 5.10.2.4.2-1: Simple data types**

| Type Name | Type Definition | Description | Applicability |
|-----------|-----------------|-------------|---------------|
|           |                 |             |               |

5.10.3 Used Features

The table below defines the features applicable to the LpiParameterProvision API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

**Table 5.10.3-1: Features used by LpiParameterProvision API**

| Feature number | Feature Name | Description |
|----------------|--------------|-------------|
|                |              |             |



## 5.11 ServiceParameter API

### 5.11.1 Resources

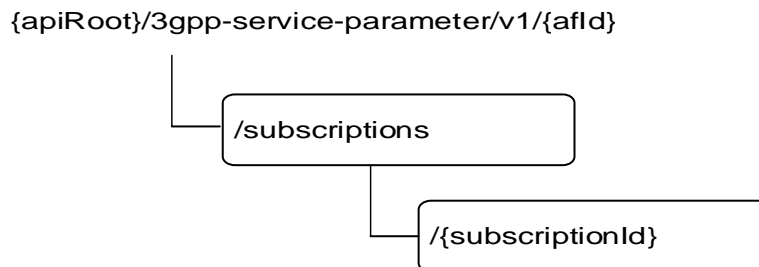
#### 5.11.1.1 Overview

All resource URIs of this API should have the following root:

**{apiRoot}/3gpp-service-parameter/v1/**

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-service-parameter" and "apiVersion" shall be set to "v1" for the current version defined in the present document. All resource URIs in the subclauses below are defined relative to the above root URI.

This subclause describes the structure for the Resource URIs as shown in figure 5.11.1.1-1 and the resources and HTTP methods used for the ServiceParameter API.



**Figure 5.9.1.1-1: Resource URI structure of the ServiceParameter API**

Table 5.11.1.1-1 provides an overview of the resources and HTTP methods applicable for the ServiceParameter API.

**Table 5.9.1.1-1: Resources and methods overview**

| Resource name                             | Resource URI                            | HTTP method | Description  |
|---|---|-------------|--|
| Service Parameter Subscriptions           | //{afId}/subscriptions                  | GET         | Read all subscriptions for a given AF.   |
|   |   | POST        | Create a new service parameter subscription.   |
| Individual Service Parameter Subscription | //{afId}/subscriptions/{subscriptionId} | GET         | Read an existing subscription identified by {subscriptionId}                             |
|   |   | PUT         | Modify all of the properties of an existing subscription identified by {subscriptionId}  |
|   |   | PATCH       | Modify some of the properties of an existing subscription identified by {subscriptionId} |
|   |   | DELETE      | Delete a subscription identified by {subscriptionId}                                     |

#### 5.11.1.2 Resource: Service Parameter Subscriptions

##### 5.11.1.2.1 Introduction

This resource allows a AF to read all active Service Parameter Subscriptions for the given AF, or create an new individual service parameter subscription in the NEF.

##### 5.11.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-service-parameter/v1/{afId}/subscriptions**

This resource shall support the resource URI variables defined in table 5.11.1.2.2-1.

**Table 5.11.1.2.2-1: Resource URI variables for this resource**

| Name    | Data type | Definition                             |
|---------|-----------|--|
| apiRoot | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4]. |
| afId    | string    | Identifier of the AF.                  |

### 5.11.1.2.3 Resource Methods

#### 5.11.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.11.1.2.3.

#### 5.11.1.2.3.2 GET

The GET method allows to read all active subscriptions for a given AF. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.11.1.2.3.2-1.

**Table 5.11.1.2.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.11.1.2.3.2-2 and the response data structures and response codes specified in table 5.11.1.2.3.2-3.

**Table 5.11.1.2.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.11.1.2.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| array(ServiceParameterData)  | M | 0..N        | 200 OK                 | All the subscription information for the AF in the request URI are returned.   |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.11.1.2.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.11.1.2.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

### 5.11.1.2.3.3 POST

The POST method creates a new resource to individual service parameter subscription for a given AF. The AF shall initiate the HTTP POST request message and the NEF shall respond to the message. The NEF shall construct the URI of the created resource.

This method shall support the request data structures specified in table 5.11.1.2.3.3-1 and the response data structures and response codes specified in table 5.11.1.2.3.3-2.

**Table 5.11.1.2.3.3-1: Data structures supported by the POST Request Body on this resource**

| Data type             | P | Cardinality | Description   |
|-----------------------|---|-------------|---|
| ServiceParameter Data | M | 1           | Parameters to create a service parameter subscription resource. |

**Table 5.11.1.2.3.3-2: Data structures supported by the POST Response Body on this resource**

| Data type   | P | Cardinality | Response codes | Description   |
|---|---|-------------|----------------|---|
| ServiceParameter Data   | M | 1           | 201 Created    | The subscription resource was created successfully.<br>The URI of the created resource shall be returned in the "Location" HTTP header. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                |   |

**Table 5.11.1.2.3.3-3: Headers supported by the 201 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-service-parameter/v1/{afId}/subscriptions/{subscriptionId} |

## 5.11.1.3 Resource: Individual Service Parameter Subscription

### 5.11.1.3.1 Introduction

This resource allows a AF to read, update or delete an existing service parameter subscription.

### 5.11.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-service-parameter/v1/{afId}/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 5.9.1.3.2-1.

**Table 5.11.1.3.2-1: Resource URI variables for this resource**

| Name           | Data type | Definition                               |
|----------------|-----------|--|
| apiRoot        | string    | Subclause 5.2.4 of 3GPP TS 29.122 [4].   |
| afId           | string    | Identifier of the AF.                    |
| subscriptionId | string    | Identifier of the subscription resource. |

## 5.11.1.3.3 Resource Methods

## 5.11.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.11.1.3.3.

## 5.11.1.3.3.2 GET

The GET method allows to read the active subscription for a given AF and subscription Id. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.11.1.3.3.2-1.

**Table 5.11.1.3.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.11.1.3.3.2-2 and the response data structures and response codes specified in table 5.11.1.3.3.2-3.

**Table 5.11.1.3.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.11.1.3.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| ServiceParameter Data  | M | 1           | 200 OK                 | The information for the subscription in the request URI are returned.  |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.11.1.3.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.11.1.3.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.11.1.3.3.3 PUT

The PUT method modifies an existing resource to update a configuration. The AF shall initiate the HTTP PUT request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.9.1.3.3.3-1 and the response data structures and response codes specified in table 5.9.1.3.3.3-2.

**Table 5.11.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource**

| Data type             | P | Cardinality | Description                      |
|-----------------------|---|-------------|----------------------------------|
| ServiceParameter Data | M | 1           | Modify an existing subscription. |

**Table 5.11.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description   |
|--|---|-------------|------------------------|---|
| ServiceParameter Data  | M | 1           | 200 OK                 | The subscription resource was updated successfully.   |
| n/a  |   |             | 204 No Content         | The subscription resource was updated successfully.   |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |   |

**Table 5.11.1.3.3.3-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.11.1.3.3.3-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.11.1.3.3.4 DELETE

The DELETE method deletes an existing individual subscription for a given AF. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.11.1.3.3.4-1.

**Table 5.11.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.11.1.3.3.4-2 and the response data structures and response codes specified in table 5.11.1.3.3.4-3.

**Table 5.11.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.11.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource**

| Data type   | P | Cardinality | Response codes         | Description  |
|---|---|-------------|------------------------|--|
| N/A   |   |             | 204 No Content         | The subscription resource was terminated successfully.   |
| N/A   |   |             | 307 Temporary Redirect | Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A   |   |             | 308 Permanent Redirect | Permanent redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.11.1.3.3.4-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.11.1.3.3.4-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

#### 5.11.1.3.3.5 PATCH

The PATCH method allows to change some properties of an existing resource to update a subscription. The AF shall initiate the HTTP PATCH request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.11.1.3.3.5-1 and the response data structures and response codes specified in table 5.11.1.3.3.5-2.

**Table 5.11.1.3.3.5-1: Data structures supported by the PATCH Request Body on this resource**

| Data type                     | P | Cardinality | Description                              |
|-------------------------------|---|-------------|--|
| ServiceParameter<br>DataPatch | M | 1           | Partial update an existing subscription. |

**Table 5.11.1.3.3.5-2: Data structures supported by the PATCH Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description   |
|--|---|-------------|------------------------|---|
| ServiceParameter Data  | M | 1           | 200 OK                 | The subscription resource was updated successfully.   |
| N/A  |   |             | 204 No Content         | The subscription resource was updated successfully.   |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |   |

**Table 5.11.1.3.3.5-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.11.1.3.3.5-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.11.2 Data Model

### 5.11.2.1 General

This subclause specifies the application data model supported by the ServiceParameter API.

### 5.11.2.2 Reused data types

The data types reused by the ServiceParameter API from other specifications are listed in table 5.9.2.2-1.

**Table 5.11.2.2-1: Re-used Data Types**

| Data type              | Reference          | Comments  |
|------------------------|--------------------|---|
| Dnn                    | 3GPP TS 29.571 [8] | Identifies a DNN.   |
| ExternalGroupId        | 3GPP TS 29.122 [4] | External Group Identifier for a user group.   |
| Gpsi                   | 3GPP TS 29.571 [8] | Identifies a GPSI.  |
| IPv4Addr               | 3GPP TS 29.571 [8] | Identifies an IPv4 address.   |
| IPv6Addr               | 3GPP TS 29.571 [8] | Identifies an IPv6 address.   |
| Link                   | 3GPP TS 29.122 [4] |   |
| MacAddr48              | 3GPP TS 29.571 [8] | Identifies an MAC address.  |
| MtcProviderInformation | 3GPP TS 29.571 [8] | Indicates MTC provider information.   |
| Sns sai                | 3GPP TS 29.571 [8] | Identifies the S-NSSAI.   |
| SupportedFeatures      | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features defined in table 5.11.3-1. |

### 5.11.2.3 Structured data types

#### 5.11.2.3.1 Introduction

This clause defines the structured data types to be used in resource representations.

#### 5.11.2.3.2 Type: ServiceParameterData

**Table 5.11.2.3.2-1: Definition of type ServiceParameterData**

| Attribute name   | Data type              | P | Cardinality | Description   | Applicability |
|--|------------------------|---|-------------|---|---------------|
| self   | Link                   | C | 0..1        | Identifies the individual service parameter subscription resource URI. Shall be present by the NEF in HTTP responses that include an object of ServiceParameterData type.                 |               |
| dnn  | Dnn                    | O | 0..1        | Identifies a DNN. (NOTE 2)  |               |
| snssai   | Snssai                 | O | 0..1        | Identifies an S-NSSAI. (NOTE 2)   |               |
| afServiceId  | string                 | O | 0..1        | Identifies a service on behalf of which the AF is issuing the request. (NOTE 2)   |               |
| appld  | string                 | O | 0..1        | Identifies an application identifier. (NOTE 2)  |               |
| gpsi   | Gpsi                   | O | 0..1        | Identifies GPSI. (NOTE 1)   |               |
| uelpv4   | Ipv4Addr               | O | 0..1        | The IPv4 address of the served UE. (NOTE 1)   |               |
| uelpv6   | Ipv6Addr               | O | 0..1        | The IPv6 address of the served UE. (NOTE 1)   |               |
| ueMac  | MacAddr48              | O | 0..1        | The MAC address of the served UE. (NOTE 1)  |               |
| externalGroupId  | ExternalGroupId        | O | 0..1        | Represents a group of users. (NOTE 1)   |               |
| anyUeInd   | boolean                | O | 0..1        | Identifies whether the service parameters applies to any UE. This attribute shall set to "true" if applicable for any UE, otherwise, set to "false". (NOTE 1)                             |               |
| paramOverPc5   | ParameterOverPc5       | O | 0..1        | Contains the service parameter used over PC5  |               |
| paramOverUu  | ParameterOverUu        | O | 0..1        | Contains the service parameter used over Uu   |               |
| mtcProviderId  | MtcProviderInformation | O | 0..1        | Indicates MTC provider information.   |               |
| suppFeat   | SupportedFeatures      | C | 0..1        | Indicates the list of Supported features used as described in subclause 5.11.3. This attribute shall be provided in the POST request and in the response of successful resource creation. |               |
| NOTE 1: One of individual UE identifier (i.e. "gpsi", "uelpv4", "uelpv6" or "ueMac" attribute), External Group Identifier (i.e. "externalGroupId" attribute) or any UE indication (i.e. "anyUeInd" attribute) shall be included. |                        |   |             |   |               |
| NOTE 2: Either the "afServiceId" attribute, "appld" attribute or the combination of "snssai" and "dnn" attributes shall be provided.   |                        |   |             |   |               |



## 5.11.2.3.3 Type: ServiceParameterDataPatch

**Table 5.11.2.3.3-1: Definition of type ServiceParameterDataPatch**

| Attribute name | Data type          | P | Cardinality | Description                                  | Applicability |
|----------------|--------------------|---|-------------|--|---------------|
| paramOverPc5   | ParameterOverPc5Rm | O | 0..1        | Contains the service parameter used over PC5 |               |
| paramOverUu    | ParameterOverUuRm  | O | 0..1        | Contains the service parameter used over Uu  |               |

## 5.11.2.4 Simple data types and enumerations

## 5.11.2.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

## 5.11.2.4.2 Simple data types

The simple data types defined in table 5.11.2.4.2-1 shall be supported.

**Table 5.11.2.4.2-1: Simple data types**

| Type Name          | Type Definition | Description   | Applicability |
|--------------------|-----------------|---|---------------|
| ParameterOverPc5   | string          | Configuration parameters for V2X communication over PC5. Its encoding shall comply with the UE policies for V2X communication over PC5 as defined in subclause 5.3 of 3GPP TS 24.588 [33] |               |
| ParameterOverPc5Rm | string          | This data type is defined in the same way as the "ParameterOverPc5" data type, but with the OpenAPI "nullable: true" property.  |               |
| ParameterOverUu    | string          | Configuration parameters for V2X communication over Uu. Its encoding shall comply with the UE policies for V2X communication over Uu as defined in subclause 5.4 of 3GPP TS 24.588 [33]   |               |
| ParameterOverUuRm  | string          | This data type is defined in the same way as the "ParameterOverUu" data type, but with the OpenAPI "nullable: true" property.   |               |

## 5.11.3 Used Features

The table below defines the features applicable to the ServiceParameter API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

**Table 5.11.3-1: Features used by ServiceParameter API**

| Feature number | Feature Name | Description |
|----------------|--------------|-------------|
|                |              |             |

## 5.12 ACSPParameterProvision API

### 5.12.1 Resources

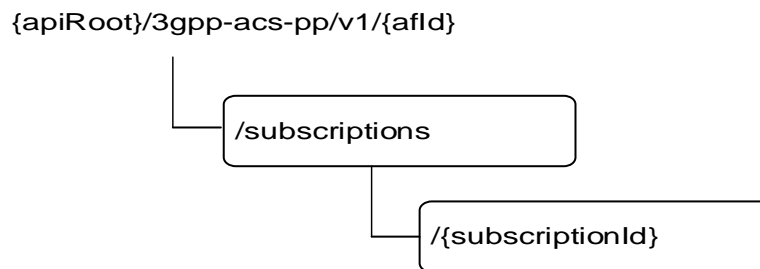
#### 5.12.1.1 Overview

All resource URIs of this API should have the following root:

**{apiRoot}/3gpp-acp-pp/v1/**

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-acp-pp" and "apiVersion" shall be set to "v1" for the current version defined in the present document. All resource URIs in the subclauses below are defined relative to the above root URI.

This subclause describes the structure for the Resource URIs as shown in figure 5.12.1.1-1 and the resources and HTTP methods used for the ACSPParameterProvision API.



**Figure 5.12.1.1-1: Resource URI structure of the ACSPParameterProvision API**

Table 5.12.1.1-1 provides an overview of the resources and HTTP methods applicable for the ACSPParameterProvision API.

**Table 5.12.1.1-1: Resources and methods overview**

| Resource name                             | Resource URI                           | HTTP method | Description   |
|---|--|-------------|---|
| ACS Configuration Subscriptions           | /{afId}/subscriptions                  | GET         | Read all subscriptions for a given AF.  |
|   |  | POST        | Create a new ACS configuration subscription.  |
| Individual ACS Configuration Subscription | /{afId}/subscriptions/{subscriptionId} | GET         | Read an existing subscription identified by {subscriptionId}                            |
|   |  | PUT         | Modify all of the properties of an existing subscription identified by {subscriptionId} |
|   |  | DELETE      | Delete a subscription identified by {subscriptionId}                                    |

#### 5.12.1.2 Resource: ACS Configuration Subscriptions

##### 5.12.1.2.1 Introduction

This resource allows a AF to read all active ACS Configuration Subscriptions for the given AF, or create an new individual ACS Configuration subscription in the NEF.

##### 5.12.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-acp-pp/v1/{afId}/subscriptions**

This resource shall support the resource URI variables defined in table 5.12.1.2.2-1.

**Table 5.12.1.2.2-1: Resource URI variables for this resource**

| Name    | Definition                             |
|---------|--|
| apiRoot | Subclause 5.2.4 of 3GPP TS 29.122 [4]. |
| afId    | Identifier of the AF of type string.   |

### 5.12.1.2.3 Resource Methods

#### 5.12.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.12.1.2.3.

#### 5.12.1.2.3.2 GET

The GET method allows to read all active subscriptions for a given AF. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.12.1.2.3.2-1.

**Table 5.12.1.2.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.12.1.2.3.2-2 and the response data structures and response codes specified in table 5.12.1.2.3.2-3.

**Table 5.12.1.2.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.12.1.2.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| array(AcsConfigurationData)  | M | 0..N        | 200 OK                 | All the subscription information for the AF in the request URI are returned.   |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.12.1.2.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.12.1.2.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

### 5.12.1.2.3.3 POST

The POST method creates a new resource to individual ACS Configuration subscription for a given AF. The AF shall initiate the HTTP POST request message and the NEF shall respond to the message. The NEF shall construct the URI of the created resource.

This method shall support the request data structures specified in table 5.12.1.2.3.3-1 and the response data structures and response codes specified in table 5.12.1.2.3.3-2.

**Table 5.12.1.2.3.3-1: Data structures supported by the POST Request Body on this resource**

| Data type             | P | Cardinality | Description   |
|-----------------------|---|-------------|---|
| AcsConfiguration Data | M | 1           | Parameters to create an individual ACS Configuration subscription resource. |

**Table 5.12.1.2.3.3-2: Data structures supported by the POST Response Body on this resource**

| Data type   | P | Cardinality | Response codes | Description   |
|---|---|-------------|----------------|---|
| AcsConfiguration Data   | M | 1           | 201 Created    | The subscription resource was created successfully.<br>The URI of the created resource shall be returned in the "Location" HTTP header. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                |   |

**Table 5.12.1.2.3.3-3: Headers supported by the 201 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description  |
|----------|-----------|---|-------------|--|
| Location | string    | M | 1           | Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-acsp/v1/{afId}/subscriptions/{subscriptionId} |

## 5.12.1.3 Resource: Individual ACS Configuration Subscription

### 5.12.1.3.1 Introduction

This resource allows a AF to read, update or delete an existing ACS Configuration subscription.

### 5.12.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-acsp/v1/{afId}/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 5.9.1.3.2-1.

**Table 5.12.1.3.2-1: Resource URI variables for this resource**

| Name           | Definition  |
|----------------|---|
| apiRoot        | Subclause 5.2.4 of 3GPP TS 29.122 [4].                  |
| afId           | Identifier of the AF of type string.                    |
| subscriptionId | Identifier of the subscription resource of type string. |

## 5.12.1.3.3 Resource Methods

## 5.12.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.12.1.3.3.

## 5.12.1.3.3.2 GET

The GET method allows to read the active subscription for a given AF and subscription Id. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.12.1.3.3.2-1.

**Table 5.12.1.3.3.2-1: URI query parameters supported by the GET method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.12.1.3.3.2-2 and the response data structures and response codes specified in table 5.12.1.3.3.2-3.

**Table 5.12.1.3.3.2-2: Data structures supported by the GET Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.12.1.3.3.2-3: Data structures supported by the GET Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description  |
|--|---|-------------|------------------------|--|
| AcsConfiguration Data  | M | 1           | 200 OK                 | The information for the subscription in the request URI are returned.  |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.12.1.3.3.2-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.12.1.3.3.2-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.12.1.3.3.3 PUT

The PUT method modifies an existing resource to update a configuration. The AF shall initiate the HTTP PUT request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.9.1.3.3.3-1 and the response data structures and response codes specified in table 5.9.1.3.3.3-2.

**Table 5.12.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource**

| Data type             | P | Cardinality | Description                      |
|-----------------------|---|-------------|----------------------------------|
| AcsConfiguration Data | M | 1           | Modify an existing subscription. |

**Table 5.12.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource**

| Data type  | P | Cardinality | Response codes         | Description   |
|--|---|-------------|------------------------|---|
| AcsConfiguration Data  | M | 1           | 200 OK                 | The subscription resource was updated successfully.   |
| n/a  |   |             | 204 No Content         | The subscription resource was updated successfully.   |
| N/A  |   |             | 307 Temporary Redirect | Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A  |   |             | 308 Permanent Redirect | Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |   |

**Table 5.12.1.3.3.3-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.12.1.3.3.3-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.12.1.3.3.4 DELETE

The DELETE method deletes an existing individual subscription for a given AF. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.12.1.3.3.4-1.

**Table 5.12.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource**

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| N/A  |           |   |             |             |

This method shall support the request data structures specified in table 5.12.1.3.3.4-2 and the response data structures and response codes specified in table 5.12.1.3.3.4-3.

**Table 5.12.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| N/A       |   |             |             |

**Table 5.12.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource**

| Data type   | P | Cardinality | Response codes         | Description  |
|---|---|-------------|------------------------|--|
| N/A   |   |             | 204 No Content         | The subscription resource was terminated successfully.   |
| N/A   |   |             | 307 Temporary Redirect | Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A   |   |             | 308 Permanent Redirect | Permanent redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.12.1.3.3.4-4: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

**Table 5.12.1.3.3.4-5: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI of the resource located in an alternative NEF. |

## 5.12.2 Data Model

### 5.12.2.1 General

This subclause specifies the application data model supported by the ACSParameterProvision API.

### 5.12.2.2 Reused data types

The data types reused by the ACSParameterProvision API from other specifications are listed in table 5.12.2.2-1.

**Table 5.12.2.2-1: Re-used Data Types**

| Data type              | Reference          | Comments   |
|------------------------|--------------------|--|
| AcsInfo                | 3GPP TS 29.571 [8] | Contains the information of ACS  |
| ExternalGroupld        | 3GPP TS 29.122 [4] | External Group Identifier for a user group.  |
| Gpsi                   | 3GPP TS 29.571 [8] | Identifies a GPSI.   |
| Link                   | 3GPP TS 29.122 [4] |  |
| MtcProviderInformation | 3GPP TS 29.571 [8] | Indicates MTC provider information.  |
| SupportedFeatures      | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features defined in table 5.9.4-1. |

### 5.12.2.3 Structured data types

#### 5.12.2.3.1 Introduction

This clause defines the structured data types to be used in resource representations.

#### 5.12.2.3.2 Type: AcsConfigurationData

**Table 5.12.2.3.2-1: Definition of type AcsConfigurationData**

| Attribute name  | Data type              | P | Cardinality | Description   | Applicability |
|---|------------------------|---|-------------|---|---------------|
| self  | Link                   | C | 0..1        | Identifies the individual service parameter subscription resource URI. Shall be present by the NEF in HTTP responses that include an object of AcsConfigurationData Data type.  |               |
| gpsi  | Gpsi                   | O | 0..1        | Identifies GPSI. (NOTE)   |               |
| exterGroupld  | ExternalGroupld        | O | 0..1        | Represents a group of users. (NOTE)   |               |
| acsInfo   | AcsInfo                | M | 1           | Contains the information of ACS.  |               |
| mtcProviderld   | MtcProviderInformation | O | 0..1        | Indicates MTC provider information.   |               |
| suppFeat  | SupportedFeatures      | M | 1           | Indicates the list of Supported features used as described in subclause 5.12.3. This parameter shall be supplied by the NF service consumer in the POST request that requested the creation of an individual ACS configuration Subscription resource. |               |
| NOTE: Only one of the "gpsi" or "exterGroupld" attribute shall be provided. |                        |   |             |   |               |

### 5.12.2.4 Simple data types and enumerations

#### 5.12.2.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

#### 5.12.2.4.2 Simple data types

The simple data types defined in table 5.12.2.4.2-1 shall be supported.



Table 5.12.2.4.2-1: Simple data types

| Type Name | Type Definition | Description | Applicability |
|-----------|-----------------|-------------|---------------|
|           |                 |             |               |

### 5.12.3 Used Features

The table below defines the features applicable to the ACSParameterProvision API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.12.3-1: Features used by ACSParameterProvision API

| Feature number | Feature Name | Description |
|----------------|--------------|-------------|
|                |              |             |

## 5.13 MoLcsNotify API

### 5.13.1 Resources

There is no resource defined for this API.

### 5.13.2 Notifications

#### 5.13.2.1 Introduction

Upon receipt of a UE location information update notification from the GMLC, the NEF shall send an HTTP POST message in order to notify the AF of the updated UE location information.

#### 5.13.2.2 Event Notification

Callback URI: **{notificationDestination}** shall be used with the callback URI variables defined in table 5.13.2.2-1.

Table 5.13.2.2-1: Callback URI variables

| Name                    | Definition  |
|-------------------------|---|
| notificationDestination | A URI indicating the notification destination where N33 notification requests shall be delivered to.<br>This URI shall be preconfigured in the NEF. |

#### 5.13.2.3 Operation Definition

##### 5.13.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.13.2.3.1-1 and the response data structures and response codes specified in table 5.13.2.3.1-2.

Table 5.13.2.3.1-1: Data structures supported by the POST Request Body on this resource

| Data type     | P | Cardinality | Description                                       |
|---------------|---|-------------|---|
| LocUpdateData | M | 1           | Delivers UE location to AF during MO-LR procedure |

**Table 5.13.2.3.1-2: Data structures supported by the POST Response Body on this resource**

| Data type   | P | Cardinality | Response codes         | Description  |
|---|---|-------------|------------------------|--|
| LocUpdateDataReply  | M | 1           | 200 OK                 | The notification is received successfully.   |
| N/A   |   |             | 307 Temporary Redirect | Temporary redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| N/A   |   |             | 308 Permanent Redirect | Permanent redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. |   |             |                        |  |

**Table 5.13.2.3.1-3: Headers supported by the 307 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

**Table 5.13.2.3.1-4: Headers supported by the 308 Response Code on this resource**

| Name     | Data type | P | Cardinality | Description   |
|----------|-----------|---|-------------|---|
| Location | string    | M | 1           | An alternative URI representing the end point of an alternative AF towards which the notification should be redirected. |

## 5.13.3 Data Model

### 5.13.3.1 General

This subclause specifies the application data model supported by the MoLcsNotify API.

### 5.13.3.2 Reused data types

The data types reused by the MoLcsNotify API from other specifications are listed in table 5.13.3.2-1.

**Table 5.13.3.2-1: Re-used Data Types**

| Data type         | Reference           | Comments  |
|-------------------|---------------------|---|
| SupportedFeatures | 3GPP TS 29.571 [8]  | Used to negotiate the applicability of the optional features defined in table 5.13.4-1. |
| Gpsi              | 3GPP TS 29.571 [8]  | Identifies a GPSI.  |
| LocationInfo      | 3GPP TS 29.122 [4]  | Represent user location information for exposure.                                       |
| LcsQosClass       | 3GPP TS 29.572 [34] | LCS QoS Class.  |
| ServiceIdentity   | 3GPP TS 29.515 [35] | Service identity  |

### 5.13.3.3 Structured data types

#### 5.13.3.3.1 Introduction

This clause defines the structured data types to be used by the MoLcsNotify API.

5.13.3.3.2 Type: LocUpdateData

This type represents a UE updated location information from the NEF to the AF.

**Table 5.13.3.3.2-1: Definition of type LocUpdateData**

| Attribute name | Data type         | P | Cardinality | Description   | Applicability |
|----------------|-------------------|---|-------------|---|---------------|
| gpsi           | Gpsi              | M | 1           | Generic Public Subscription identifier  |               |
| locInfo        | LocationInfo      | M | 1           | Represent user location information for exposure.                               |               |
| lcsQosClass    | LcsQosClass       | M | 1           | LCS QoS Class.  |               |
| svclId         | ServiceIdentity   | O | 0..1        | Service Identity may be specified by the UE for LCS request.                    |               |
| suppFeat       | SupportedFeatures | M | 1           | Indicates the list of Supported features used as described in subclause 5.13.4. |               |

5.13.3.3.3 Type: LocUpdateDataReply

This data type represents a reply to a MO LCS notification and is sent from the AF to the NEF.

**Table 5.13.3.3.3-1: Definition of type LocUpdateDataReply**

| Attribute name | Data type         | P | Cardinality | Description   | Applicability |
|----------------|-------------------|---|-------------|---|---------------|
| suppFeat       | SupportedFeatures | M | 1           | Indicates the list of Supported features used as described in subclause 5.13.4. |               |

5.13.3.4 Simple data types and enumerations

5.13.3.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

5.13.3.4.2 Simple data types

The simple data types defined in table 5.13.3.4.2-1 shall be supported.

**Table 5.13.3.4.2-1: Simple data types**

| Type Name | Type Definition | Description | Applicability |
|-----------|-----------------|-------------|---------------|
|           |                 |             |               |

5.13.4 Used Features

The table below defines the features applicable to the MoLcsNotify API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

**Table 5.13.4-1: Features used by MoLcsNotify API**

| Feature number | Feature Name | Description |
|----------------|--------------|-------------|
|                |              |             |

---

## 6 Security

TLS (IETF RFC 5246 [16]) shall be used to support the security communication between the NEF and the AF over NEF Northbound interface as defined in subclause 12 of 3GPP TS 33.501 [6]. The access to the SCEF northbound APIs shall be authorized by means of OAuth2 protocol (see IETF RFC 6749 [13]), based on local configuration, using the "Client Credentials" authorization grant. If OAuth2 is used, a client, prior to consuming services offered by the NEF Northbound APIs, shall obtain a "token" from the authorization server.

---

## 7 Using Common API Framework

### 7.1 General

When CAPIF is used with an NEF that is used for external exposure, the NEF shall support the following as defined in 3GPP TS 29.222 [12]:

- the API exposing function and related APIs over CAPIF-2/2e and CAPIF-3 reference points;
- the API publishing function and related APIs over CAPIF-4 reference point;
- the API management function and related APIs over CAPIF-5 reference point; and
- at least one of the security methods for authentication and authorization, and related security mechanisms.

In a centralized deployment as defined in 3GPP TS 23.222 [11], where the CAPIF core function and API provider domain functions are co-located, the interactions between the CAPIF core function and API provider domain functions may be independent of CAPIF-3, CAPIF-4 and CAPIF-5 reference points.

### 7.2 Security

When CAPIF is used for external exposure, before invoking the API exposed by the NEF, the AF as API invoker shall negotiate the security method (PKI, TLS-PSK or OAUTH2) with CAPIF core function and ensure the NEF has enough credential to authenticate the AF (see 3GPP TS 29.222 [12], subclause 5.6.2.2 and subclause 6.2.2.2).

If PKI or TLS-PSK is used as the selected security method between the AF and the NEF, upon API invocation, the NEF shall retrieve the authorization information from the CAPIF core function as described in 3GPP TS 29.222 [12], subclause 5.6.2.4.

As indicated in 3GPP TS 33.122 [14], the access to the NEF northbound APIs may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [13]), using the "Client Credentials" authorization grant, where the CAPIF core function (see 3GPP TS 29.222 [12]) plays the role of the authorization server.

NOTE 1: In this release, only "Client Credentials" authorization grant is supported.

If OAuth2 is used as the selected security method between the AF and the NEF, the AF, prior to consuming services offered by the NEF northbound APIs, shall obtain a "token" from the authorization server, by invoking the Obtain\_Authorization service, as described in 3GPP TS 29.222 [12], subclause 5.6.2.3.2.

The NEF northbound APIs do not define any scopes for OAuth2 authorization. It is the NEF responsibility to check whether the AF is authorized to use an API based on the "token". Once the NEF verifies the "token", it shall check whether the NEF identifier in the "token" matches its own published identifier, and whether the API name in the "token" matches its own published API name. If those checks are passed, the AF has full authority to access any resource or operation for the invoked API.

NOTE 2: For aforementioned security methods, the NEF needs to apply admission control according to access control policies after performing the authorization checks.

NOTE 3: The security requirement in the current subclause does not apply for the NiddConfigurationTrigger and the MsisdnLessMoSms APIs since they are the NEF initiated interaction with the AF. How the security scheme works for the NiddConfigurationTrigger and MsisdnLessMoSms APIs is left to configuration.

---

# Annex A (normative): OpenAPI representation for NEF Northbound APIs

## A.1 General

This Annex is based on the OpenAPI 3.0.0 specification [5] and provides corresponding representations of all APIs defined in the present specification.

NOTE 1: An OpenAPIs representation embeds JSON Schema representations of HTTP message bodies.

This Annex shall take 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 2: 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 clause 5B of the 3GPP TR 21.900 [21] and subclause 5.3.1 of the 3GPP TS 29.501 [32] for further information).

---

## A.2 TrafficInfluence API

```
openapi: 3.0.0
info:
  title: 3gpp-traffic-influence
  version: 1.1.2
  description: |
    API for AF traffic influence
    © 2021, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.7.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
- {}
- oAuth2ClientCredentials: []
servers:
- url: '{apiRoot}/3gpp-traffic-influence/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
    get:
      summary: read all of the active subscriptions for the AF
      tags:
        - Traffic Influence Subscription
      responses:
        '200':
          description: OK.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/TrafficInfluSub'
        '307':
```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

## post:

```

summary: Creates a new subscription resource
tags:
  - Traffic Influence Subscription
requestBody:
  description: Request to create a new subscription resource
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/TrafficInfluSub'
callbacks:
  notificationDestination:
    '{request.body#/notificationDestination}':
      post:
        requestBody: # contents of the callback message
          required: true
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/EventNotification'
        callbacks:
          afAcknowledgement:
            '{request.body#/afAckUri}':
              post:
                requestBody: # contents of the callback message
                  required: true
                  content:
                    application/json:
                      schema:
                        $ref: '#/components/schemas/AfAckInfo'
  responses:
    '204':
      description: No Content (successful acknowledgement)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'

```

```

        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      responses:
        '204':
          description: No Content (successful notification)
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    responses:
      '201':
        description: Created (Successful creation of subscription)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/TrafficInfluSub'
        headers:
          Location:
            description: 'Contains the URI of the newly created resource'
            required: true
            schema:
              type: string
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/subscriptions/{subscriptionId}:
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId

```

```
in: path
description: Identifier of the subscription resource
required: true
schema:
  type: string
get:
summary: read an active subscriptions for the SCS/AS and the subscription Id
tags:
  - Individual Traffic Influence Subscription
responses:
  '200':
    description: OK (Successful get the active subscription)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/TrafficInfluSub'
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
put:
summary: Updates/replaces an existing subscription resource
tags:
  - Individual Traffic Influence Subscription
requestBody:
description: Parameters to update/replace the existing subscription
required: true
content:
  application/json:
    schema:
      $ref: '#/components/schemas/TrafficInfluSub'
responses:
  '200':
    description: OK (Successful update of the subscription)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/TrafficInfluSub'
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
```



```
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

patch:
  summary: Updates/replaces an existing subscription resource
  tags:
    - Individual Traffic Influence Subscription
  requestBody:
    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/TrafficInfluSubPatch'
  responses:
    '200':
      description: OK. The subscription was modified successfully.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/TrafficInfluSub'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing subscription
  tags:
    - Individual Traffic Influence Subscription
  responses:
    '204':
      description: No Content (Successful deletion of the existing subscription)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
```

```

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    TrafficInfluSub:
      type: object
      properties:
        afServiceId:
          type: string
          description: Identifies a service on behalf of which the AF is issuing the request.
        afAppId:
          type: string
          description: Identifies an application.
        afTransId:
          type: string
          description: Identifies an NEF Northbound interface transaction, generated by the AF.
        appReloInd:
          type: boolean
          description: Identifies whether an application can be relocated once a location of the
application has been selected.
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        snssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        externalGroupId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        anyUeInd:
          type: boolean
          description: Identifies whether the AF request applies to any UE. This attribute shall set
to "true" if applicable for any UE, otherwise, set to "false".
        subscribedEvents:
          type: array
          items:
            $ref: '#/components/schemas/SubscribedEvent'
          minItems: 1
          description: Identifies the requirement to be notified of the event(s).
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        ipv4Addr:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Ipv4Addr'
        ipDomain:
          type: string
        ipv6Addr:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Ipv6Addr'
        macAddr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
        dnaiChgType:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DnaiChangeType'
        notificationDestination:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        requestTestNotification:
          type: boolean
          description: Set to true by the SCS/AS to request the NEF to send a test notification as
defined in subclause 5.2.5.3. Set to false or omitted otherwise.
        websocketNotifConfig:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsocketNotifConfig'
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        trafficFilters:
          type: array
          items:
            $ref: 'TS29122_CommonData.yaml#/components/schemas/FlowInfo'
          minItems: 1
          description: Identifies IP packet filters.
        ethTrafficFilters:
          type: array
          items:
            $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'
          minItems: 1
          description: Identifies Ethernet packet filters.
        trafficRoutes:
          type: array
          items:

```

```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
    minItems: 1
    description: Identifies the N6 traffic routing requirement.
  tfcCorrInd:
    type: boolean
  tempValidities:
    type: array
    items:
      $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/TemporalValidity'
  validGeoZoneIds:
    type: array
    items:
      type: string
    minItems: 1
    description: Identifies a geographic zone that the AF request applies only to the traffic
of UE(s) located in this specific zone.
  afAckInd:
    type: boolean
  addrPreserInd:
    type: boolean
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  allOf:
    - oneOf:
      - required: [afAppId]
      - required: [trafficFilters]
      - required: [ethTrafficFilters]
    - oneOf:
      - required: [ipv4Addr]
      - required: [ipv6Addr]
      - required: [macAddr]
      - required: [gpsi]
      - required: [externalGroupId]
      - required: [anyUeInd]
  anyOf:
    - not:
      required: [subscribedEvents]
    - required: [notificationDestination]
  TrafficInfluSubPatch:
    type: object
    properties:
      appReloInd:
        type: boolean
        description: Identifies whether an application can be relocated once a location of the
application has been selected.
        nullable: true
      trafficFilters:
        type: array
        items:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/FlowInfo'
        minItems: 1
        description: Identifies IP packet filters.
      ethTrafficFilters:
        type: array
        items:
          $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'
        minItems: 1
        description: Identifies Ethernet packet filters.
      trafficRoutes:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
        minItems: 1
        description: Identifies the N6 traffic routing requirement.
      tfcCorrInd:
        type: boolean
        nullable: true
      tempValidities:
        type: array
        items:
          $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/TemporalValidity'
        minItems: 1
        nullable: true
      validGeoZoneIds:
        type: array
        items:
          type: string
        minItems: 1

```

description: Identifies a geographic zone that the AF request applies only to the traffic of UE(s) located in this specific zone.

```

    nullable: true
  afAckInd:
    type: boolean
    nullable: true
  addrPreserInd:
    type: boolean
    nullable: true
EventNotification:
  type: object
  properties:
    afTransId:
      type: string
      description: Identifies an NEF Northbound interface transaction, generated by the AF.
    dnaiChgType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DnaiChangeType'
    sourceTrafficRoute:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
    subscribedEvent:
      $ref: '#/components/schemas/SubscribedEvent'
    targetTrafficRoute:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
    sourceDnai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    targetDnai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    srcUeIpv4Addr:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Ipv4Addr'
    srcUeIpv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    tgtUeIpv4Addr:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Ipv4Addr'
    tgtUeIpv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    ueMac:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
    afAckUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
  required:
    - dnaiChgType
    - subscribedEvent
AfResultInfo:
  type: object
  properties:
    afStatus:
      $ref: '#/components/schemas/AfResultStatus'
    trafficRoute:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
  required:
    - afStatus
AfAckInfo:
  type: object
  properties:
    afTransId:
      type: string
    ackResult:
      $ref: '#/components/schemas/AfResultInfo'
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  required:
    - ackResult
SubscribedEvent:
  anyOf:
    - type: string
    enum:
      - UP_PATH_CHANGE
    - type: string
  description: >
  Possible values are
    - UP_PATH_CHANGE: The AF requests to be notified when the UP path changes for the PDU
session.
AfResultStatus:
  anyOf:
    - type: string
    enum:

```

```

    - SUCCESS
    - TEMPORARY_CONGESTION
    - RELOC_NO_ALLOWED
    - OTHER
  - type: string
description: >
Possible values are
- SUCCESS: The application layer is ready or the relocation is completed.
- TEMPORARY_CONGESTION: The application relocation fails due to temporary congestion.
- RELOC_NO_ALLOWED: The application relocation fails because application relocation is not
allowed.
- OTHER: The application relocation fails due to other reason.

```

---

## A.3 NiddConfigurationTrigger API

```

openapi: 3.0.0
info:
  title: 3gpp-nidd-configuration-trigger
  version: 1.0.1
  description: |
    API for NIDD Configuration Trigger.
    © 2021, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.7.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /:
    post:
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/NiddConfigurationTrigger'
      responses:
        '200':
          description: Success
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/NiddConfigurationTriggerReply'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':

```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    NiddConfigurationTrigger:
      type: object
      properties:
        afId:
          type: string
          description: Identifies the trigger receiving entity.
        nefId:
          type: string
          description: Identifies the trigger sending entity.
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - afId
        - nefId
        - gpsi
        - suppFeat
    NiddConfigurationTriggerReply:
      type: object
      properties:
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - suppFeat

```

---

## A.4 AnalyticsExposure API

```

openapi: 3.0.0
info:
  title: 3gpp-analyticsexposure
  version: 1.0.4
  description: |
    API for Analytics Exposure.
    © 2021, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.8.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}/3gpp-analyticsexposure/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      tags:
        - Analytics Exposure Subscriptions
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
        - name: supp-feat

```

```

    in: query
    description: Features supported by the NF service consumer
    required: false
    schema:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  responses:
    '200':
      description: OK (Successful get all of the active subscriptions for the AF)
      content:
        application/json:
          schema:
            type: array
            items:
              $ref: '#/components/schemas/AnalyticsExposureSubsc'
            minItems: 0
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29122_CommonData.yaml#/components/responses/406'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

post:
  summary: Creates a new subscription resource
  tags:
    - Analytics Exposure Subscriptions
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
  requestBody:
    description: new subscription creation
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AnalyticsExposureSubsc'
  callbacks:
    notification:
      '{request.body#/notifUri}':
        post:
          requestBody: # contents of the callback message
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/AnalyticsEventNotification'
  responses:
    '204':
      description: No Content (successful notification)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':

```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
responses:
  '201':
    description: Created (Successful creation)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AnalyticsExposureSubsc'
    headers:
      Location:
        description: 'Contains the URI of the newly created resource'
        required: true
        schema:
          type: string
  '204':
    description: Successful case. The resource has been successfully created and no additional
content is to be sent in the response message.
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
/{afId}/subscriptions/{subscriptionId}:
  get:
    summary: read an active subscription for the AF and the subscription Id
    tags:
      - Individual Analytics Exposure Subscription
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: subscriptionId
        in: path
        description: Identifier of the subscription resource
        required: true
        schema:
          type: string
      - name: supp-feat
        in: query
        description: Features supported by the NF service consumer
        required: false

```



```

    schema:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  responses:
    '200':
      description: OK (Successful get the active subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AnalyticsExposureSubsc'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29122_CommonData.yaml#/components/responses/406'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
  summary: Updates/replaces an existing subscription resource
  tags:
    - Individual Analytics Exposure Subscription
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  requestBody:
    description: Parameters to update/replace the existing subscription
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AnalyticsExposureSubsc'
  responses:
    '200':
      description: OK (Successful deletion of the existing subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AnalyticsExposureSubsc'
    '204':
      description: Successful case. The resource has been successfully updated and no additional
content is to be sent in the response message.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'

```

```

'411':
  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing subscription
  tags:
    - Individual Analytics Exposure Subscription
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  responses:
    '204':
      description: No Content (Successful deletion of the existing subscription)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/fetch:
  post:
    summary: Fetch analytics information
    tags:
      - AnalyticsExposure API Fetch analytics information
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AnalyticsRequest'
    responses:
      '200':
        description: The requested information was returned successfully.
        content:

```

```

    application/json:
      schema:
        $ref: '#/components/schemas/AnalyticsData'
  '204':
    description: No Content (The requested Analytics data does not exist)
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

```

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    AnalyticsExposureSubsc:
      type: object
      properties:
        analyEventsSubs:
          type: array
          items:
            $ref: '#/components/schemas/AnalyticsEventSubsc'
          minItems: 1
        analyRepInfo:
          $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
        notifUri:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        notifId:
          type: string
        eventNotifis:
          type: array
          items:
            $ref: '#/components/schemas/AnalyticsEventNotif'
          minItems: 1
        failEventReports:
          type: array
          items:
            $ref: '#/components/schemas/AnalyticsFailureEventInfo'
          minItems: 1
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        requestTestNotification:
          type: boolean
          description: Set to true by the AF to request the NEF to send a test notification as
defined in subclause 5.2.5.3 of 3GPP TS 29.122. Set to false or omitted otherwise.
        websocketNotifConfig:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsocketNotifConfig'
      required:
        - analyEventsSubs
        - notifUri

```



```

appIds:
  type: array
  items:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
  minItems: 1
dnn:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
exceptRequs:
  type: array
  items:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/Exception'
  minItems: 1
exptAnaType:
  $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ExpectedAnalyticsType'
exptUeBehav:
  $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/ExpectedUeBehaviourData'
reptThlds:
  type: array
  items:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ThresholdLevel'
  minItems: 1
snssai:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
qosReq:
  $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/QosRequirement'
qosFlowRetThds:
  type: array
  items:
    $ref:
      'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/RetainabilityThreshold'
  minItems: 1
ranUeThrouThds:
  type: array
  items:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
  minItems: 1
extraReportReq:
  $ref:
    'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/EventReportingRequirement'
TargetUeId:
  type: object
  properties:
    anyUeInd:
      type: boolean
  gpsi:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  exterGroupId:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
UeMobilityExposure:
  type: object
  properties:
    ts:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    recurringTime:
      $ref: 'TS29122_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'
    duration:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
    durationVariance:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    locInfo:
      type: array
      items:
        $ref: '#/components/schemas/UeLocationInfo'
      minItems: 1
  required:
    - duration
    - locInfo
UeLocationInfo:
  type: object
  properties:
    loc:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    ratio:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SamplingRatio'
    confidence:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
  required:
    - loc

```

```
AnalyticsRequest:
  type: object
  properties:
    analyEvent:
      $ref: '#/components/schemas/AnalyticsEvent'
    analyEventFilter:
      $ref: '#/components/schemas/AnalyticsEventFilter'
    analyRep:
      $ref:
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/EventReportingRequirement'
    tgtUe:
      $ref: '#/components/schemas/TargetUeId'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
  - analyEvent
  - suppFeat
AnalyticsEventFilter:
  type: object
  properties:
    locArea:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    nwPerfTypes:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NetworkPerfType'
      minItems: 1
    appIds:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
      minItems: 1
    excepIds:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ExceptionId'
      minItems: 1
    exptAnaType:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ExpectedAnalyticsType'
    exptUeBehav:
      $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/ExpectedUeBehaviourData'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    qosReq:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/QosRequirement'
AnalyticsData:
  type: object
  properties:
    expiry:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    ueMobilityInfos:
      type: array
      items:
        $ref: '#/components/schemas/UeMobilityExposure'
      minItems: 1
    ueCommInfos:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/UeCommunication'
      minItems: 1
    nwPerfInfos:
      type: array
      items:
        $ref: '#/components/schemas/NetworkPerfExposure'
      minItems: 1
    abnormalInfos:
      type: array
      items:
        $ref: '#/components/schemas/AbnormalExposure'
      minItems: 1
    congestInfos:
      type: array
      items:
        $ref: '#/components/schemas/CongestInfo'
      minItems: 1
    qosSustainInfos:
```

```

    type: array
    items:
      $ref: '#/components/schemas/QosSustainabilityExposure'
    minItems: 1
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - suppFeat
NetworkPerfExposure:
  type: object
  properties:
    locArea:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    nwPerfType:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NetworkPerfType'
    relativeRatio:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SamplingRatio'
    absoluteNum:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
    confidence:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
  required:
    - locArea
    - nwPerfType
AbnormalExposure:
  type: object
  properties:
    gpsis:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      minItems: 1
    appId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
    excep:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/Exception'
    ratio:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SamplingRatio'
    confidence:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
    addtMeasInfo:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/AdditionalMeasurement'
  required:
    - excep
CongestInfo:
  type: object
  properties:
    locArea:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    cngAnas:
      type: array
      items:
        $ref: '#/components/schemas/CongestionAnalytics'
      minItems: 1
  required:
    - locArea
    - cngAnas
CongestionAnalytics:
  type: object
  properties:
    cngType:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/CongestionType'
    tmWdw:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
    nsi:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ThresholdLevel'
    confidence:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
  required:
    - cngType
    - tmWdw
    - nsi
QosSustainabilityExposure:
  type: object
  properties:
    locArea:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    startTs:

```

```

    $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
  endTs:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
  qosFlowRetThd:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/RetainabilityThreshold'
  ranUeThrouThd:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
  confidence:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  required:
    - locArea
    - startTs
    - endTs
AnalyticsFailureEventInfo:
  type: object
  properties:
    event:
      $ref: '#/components/schemas/AnalyticsEvent'
    failureCode:
      $ref: '#/components/schemas/AnalyticsFailureCode'
  required:
    - event
    - failureCode
AnalyticsEvent:
  anyOf:
  - type: string
    enum:
      - UE_MOBILITY
      - UE_COMM
      - ABNORMAL_BEHAVIOR
      - CONGESTION
      - NETWORK_PERFORMANCE
      - QOS_SUSTAINABILITY
  - 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
      - UE_MOBILITY: The AF requests to be notified about analytics information of UE mobility.
      - UE_COMM: The AF requests to be notified about analytics information of UE communication.
      - ABNORMAL_BEHAVIOR: The AF requests to be notified about analytics information of UE's
      abnormal behavior.
      - CONGESTION: The AF requests to be notified about analytics information of user data
      congestion information.
      - NETWORK_PERFORMANCE: The AF requests to be notified about analytics information of network
      performance.
      - QOS_SUSTAINABILITY: The AF requests to be notified about analytics information of QoS
      sustainability.
AnalyticsFailureCode:
  anyOf:
  - type: string
    enum:
      - UNAVAILABLE_DATA
      - BOTH_STAT_PRED_NOT_ALLOWED
      - OTHER
  - type: string
    description: >
      This string provides forward-compatibility with future
      extensions to the enumeration but is not used to encode
      content defined in the present version of this API.
    description: >
      Possible values are
      - UNAVAILABLE_DATA: The event is rejected since necessary data to perform the service is
      unavailable.
      - BOTH_STAT_PRED_NOT_ALLOWED: The event is rejected since the start time is in the past
      and the end time is in the future, which means the NF service consumer requested both statistics and
      prediction for the analytics.
      - OTHER: The event is rejected due to other reasons.

```

---

## A.5 5GLANParameterProvision API

openapi: 3.0.0



```
info:
  title: 3gpp-5glan-pp
  version: 1.0.2
  description: |
    API for 5G LAN Parameter Provision.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.17.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}/3gpp-5glan-pp/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      tags:
        - 5GLAN Parameters Provision Subscriptions
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      responses:
        '200':
          description: OK (Successful get all of the active subscriptions for the AF)
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/5GLanParametersProvision'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    post:
      summary: Creates a new subscription resource
      tags:
        - 5GLAN Parameters Provision Subscriptions
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      requestBody:
        description: new subscription creation
```

```

    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/5GLanParametersProvision'
  responses:
    '201':
      description: Created (Successful creation)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/5GLanParametersProvision'
      headers:
        Location:
          description: 'Contains the URI of the newly created resource'
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/subscriptions/{subscriptionId}:
  get:
    summary: read an active subscription for the AF and the subscription Id
    tags:
      - Individual 5GLAN Parameters Provision Subscription
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: subscriptionId
        in: path
        description: Identifier of the subscription resource
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK (Successful get the active subscription)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/5GLanParametersProvision'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'

```

```

'406':
  $ref: 'TS29122_CommonData.yaml#/components/responses/406'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
  summary: Updates/replaces an existing subscription resource
  tags:
    - Individual 5GLAN Parameters Provision Subscription
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  requestBody:
    description: Parameters to update/replace the existing subscription
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/5GLanParametersProvision'
  responses:
    '200':
      description: OK (Successful deletion of the existing subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/5GLanParametersProvision'
    '204':
      description: Successful case. The resource has been successfully updated and no additional
content is to be sent in the response message.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

patch:
  summary: Partial updates an existing subscription resource
  tags:
    - Individual 5GLAN Parameters Provision Subscription
  parameters:
    - name: afId

```

```

    in: path
    description: Identifier of the AF
    required: true
    schema:
      type: string
  - name: subscriptionId
    in: path
    description: Identifier of the subscription resource
    required: true
    schema:
      type: string
requestBody:
  required: true
  content:
    application/merge-patch+json:
      schema:
        $ref: '#/components/schemas/5GLanParametersProvisionPatch'
responses:
  '200':
    description: OK. The subscription was modified successfully.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/5GLanParametersProvision'
  '204':
    description: Successful case. The resource has been successfully updated and no additional
content is to be sent in the response message.
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing subscription
  tags:
    - Individual 5GLAN Parameters Provision Subscription
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  responses:
    '204':
      description: No Content (Successful deletion of the existing subscription)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'

```

```

'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    5GLanParametersProvision:
      type: object
      properties:
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        5gLanParams:
          $ref: '#/components/schemas/5GLanParameters'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - 5gLanParams
        - suppFeat

    5GLanParametersProvisionPatch:
      type: object
      properties:
        5gLanParamsPatch:
          $ref: '#/components/schemas/5GLanParametersPatch'
        5gLanParams:
          $ref: '#/components/schemas/5GLanParameters'

    5GLanParameters:
      type: object
      properties:
        exterGroupId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        gpsis:
          type: object
          additionalProperties:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
          minProperties: 1
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        aaaIpv4Addr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
        aaaIpv6Addr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
        aaaUsgs:
          type: array
          items:
            $ref: '#/components/schemas/AaaUsage'
          minItems: 1
        mtcProviderId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
        snssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        sessionType:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionType'
        appDesps:
          type: object
          additionalProperties:
            $ref: '#/components/schemas/AppDescriptor'
          minProperties: 1

```

```

required:
  - exterGroupId
  - gpsis
  - dnn
  - snssai
  - sessionType
  - appDesps

5GLanParametersPatch:
  deprecated: true
  type: object
  properties:
    gpsis:
      type: object
      additionalProperties:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/GpsiRm'
      minProperties: 1
    appDesps:
      type: object
      additionalProperties:
        $ref: '#/components/schemas/AppDescriptorRm'
      minProperties: 1

AppDescriptor:
  type: object
  properties:
    osId:
      $ref: 'TS29519_Policy_Data.yaml#/components/schemas/OsId'
    appIds:
      type: object
      additionalProperties:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
      minProperties: 1
  required:
    - osId
    - appIds

AppDescriptorRm:
  type: object
  properties:
    appIds:
      type: object
      additionalProperties:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationIdRm'
      minProperties: 1

AaaUsage:
  anyOf:
    - type: string
      enum:
        - AUTH
        - IP_ALLOC
    - type: string
      description: >
        This string identifies the usage of secondary authentication/authorization, and/or UE IP
        address allocation from the DN-AAA server.
      description: >
        Possible values are
        - AUTH: secondary authentication/authorization needed from DN-AAA server.
        - IP_ALLOC: UE IP address allocation needed from DN-AAA server.

```

---

## A.6 ApplyingBdtPolicy API

```

openapi: 3.0.0
info:
  title: 3gpp-applying-bdt-policy
  version: 1.0.2
  description: |
    API for applying BDT policy
    © 2021, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.7.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:

```

```

- {}
- oAuth2ClientCredentials: []
servers:
- url: '{apiRoot}/3gpp-applying-bdt-policy/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.

paths:
  /{afId}/subscriptions:
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
    get:
      summary: read all of the active subscriptions for the AF
      tags:
        - Applied BDT Policy Subscription
      responses:
        '200':
          description: OK.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/AppliedBdtPolicy'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    post:
      summary: Creates a new subscription resource
      tags:
        - Applied BDT Policy Subscription
      requestBody:
        description: Request to create a new subscription resource
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppliedBdtPolicy'
      responses:
        '201':
          description: Created (Successful creation of subscription)
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/AppliedBdtPolicy'
          headers:
            Location:
              description: 'Contains the URI of the newly created resource'
              required: true
              schema:

```

```

    type: string
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/subscriptions/{subscriptionId}:
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  get:
    summary: read an active subscriptions for the SCS/AS and the subscription Id
    tags:
      - Individual Applied BDT Policy Subscription
    responses:
      '200':
        description: OK (Successful get the active subscription)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppliedBdtPolicy'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  patch:
    summary: Updates/replaces an existing subscription resource
    tags:
      - Individual Applied BDT Policy Subscription
    requestBody:
      required: true

```



```

content:
  application/merge-patch+json:
    schema:
      $ref: '#/components/schemas/AppliedBdtPolicyPatch'
responses:
  '200':
    description: OK. The subscription was modified successfully.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AppliedBdtPolicy'
  '204':
    description: No content. The subscription was modified successfully.
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
delete:
  summary: Deletes an already existing subscription
  tags:
    - Individual Applied BDT Policy Subscription
  responses:
    '204':
      description: No Content (Successful deletion of the existing subscription)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    AppliedBdtPolicy:
      type: object

```

```

properties:
  externalGroupId:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
  gpsi:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  bdtRefId:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/BdtReferenceId'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  self:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
required:
- bdtRefId
- suppFeat
oneOf:
- required: [gpsi]
- required: [externalGroupId]
AppliedBdtPolicyPatch:
  type: object
  properties:
    bdtRefId:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/BdtReferenceId'
  required:
- bdtRefId

```

---

## A.7 IPTVConfiguration API

```

openapi: 3.0.0
info:
  title: 3gpp-iptvconfiguration
  version: 1.0.1
  description: |
    API for IPTV configuration.
    © 2021, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.7.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
- {}
- oAuth2ClientCredentials: []
servers:
- url: '{apiRoot}/3gpp-iptvconfiguration/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/configurations:
    get:
      summary: read all of the active configurations for the AF
      tags:
      - IPTV Configurations
      parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      responses:
        '200':
          description: OK (Successful get all of the active configurations for the AF)
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/IptvConfigData'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'

```

```

'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'406':
  $ref: 'TS29122_CommonData.yaml#/components/responses/406'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

post:
  summary: Creates a new configuration resource
  tags:
    - IPTV Configurations
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
  requestBody:
    description: new configuration creation
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/IptvConfigData'
  responses:
    '201':
      description: Created (Successful creation of configuration)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/IptvConfigData'
      headers:
        Location:
          description: 'Contains the URI of the newly created resource'
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/configurations/{configurationId}:
  get:
    summary: read an active configuration for the AF and the configuration Id
    tags:
      - Individual IPTV Configuration

```

```

parameters:
  - name: afId
    in: path
    description: Identifier of the AF
    required: true
    schema:
      type: string
  - name: configurationId
    in: path
    description: Identifier of the configuration resource
    required: true
    schema:
      type: string
responses:
  '200':
    description: OK (Successful get the active configuration)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/IptvConfigData'
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
  summary: Updates/replaces an existing configuration resource
  tags:
    - Individual IPTV Configuration
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: configurationId
      in: path
      description: Identifier of the configuration resource
      required: true
      schema:
        type: string
  requestBody:
    description: Parameters to update/replace the existing configuration
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/IptvConfigData'
  responses:
    '200':
      description: OK (Successful deletion of the existing configuration)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/IptvConfigData'
    '204':
      description: Successful case. The resource has been successfully updated and no additional
      content is to be sent in the response message.
    '307':

```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

patch:

summary: Partial updates an existing configuration resource

tags:

- Individual IPTV Configuration

parameters:

- name: afId
  - in: path
  - description: Identifier of the AF
  - required: true
  - schema:
    - type: string
- name: configurationId
  - in: path
  - description: Identifier of the configuration resource
  - required: true
  - schema:
    - type: string

requestBody:

required: true

content:

application/merge-patch+json:

schema:

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

responses:

'200':

description: OK. The configuration was modified successfully.

content:

application/json:

schema:

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

'204':

description: Successful case. The resource has been successfully updated and no additional content is to be sent in the response message.

'307':

\$ref: 'TS29122\_CommonData.yaml#/components/responses/307'

'308':

\$ref: 'TS29122\_CommonData.yaml#/components/responses/308'

'400':

\$ref: 'TS29122\_CommonData.yaml#/components/responses/400'

'401':

\$ref: 'TS29122\_CommonData.yaml#/components/responses/401'

'403':

\$ref: 'TS29122\_CommonData.yaml#/components/responses/403'

'404':

\$ref: 'TS29122\_CommonData.yaml#/components/responses/404'

'411':

\$ref: 'TS29122\_CommonData.yaml#/components/responses/411'

'413':

\$ref: 'TS29122\_CommonData.yaml#/components/responses/413'

'415':

\$ref: 'TS29122\_CommonData.yaml#/components/responses/415'

'429':

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing configuration
  tags:
    - Individual IPTV Configuration
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: configurationId
      in: path
      description: Identifier of the configuration resource
      required: true
      schema:
        type: string
  responses:
    '204':
      description: No Content (Successful deletion of the existing configuration)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    IptvConfigData:
      type: object
      properties:
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        exterGroupId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        afAppId:
          type: string
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        snssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        multiAccCtrls:
          type: object
          additionalProperties:
            $ref: '#/components/schemas/MulticastAccessControl'
          minProperties: 1
        mtcProviderId:

```

```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
  - afAppId
  - multiAccCtrls
  - suppFeat
IptvConfigDataPatch:
  type: object
  properties:
    multiAccCtrls:
      type: object
      additionalProperties:
        $ref: '#/components/schemas/MulticastAccessControl'
      minProperties: 1
MulticastAccessControl:
  type: object
  properties:
    srcIpv4Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    srcIpv6Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
    multicastV4Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    multicastV6Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
    accStatus:
      $ref: '#/components/schemas/AccessRightStatus'
  required:
  - accStatus
AccessRightStatus:
  anyOf:
  - type: string
    enum:
    - FULLY_ALLOWED
    - PREVIEW_ALLOWED
    - NO_ALLOWED
  - type: string
description: >
Possible values are
- FULLY_ALLOWED: The User is fully allowed to access to the channel.
- PREVIEW_ALLOWED: The User is preview allowed to access to the channel.
- NO_ALLOWED: The User is not allowed to access to the channel.

```

---

## A.8 LpiParameterProvision API

```

openapi: 3.0.0
info:
  title: 3gpp-lpi-pp
  version: 1.0.2
  description: |
    API for Location Privacy Indication Parameters Provisioning.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.13.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
- {}
- oAuth2ClientCredentials: []
servers:
- url: '{apiRoot}/3gpp-lpi-pp/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/provisionedLpis:
    get:
      summary: read all of the active LPI Parameters Provisioning resources for the AF
      tags:
      - LPI Parameters Provisionings
      parameters:
      - name: afId
        in: path

```

```

    description: Identifier of the AF
    required: true
    schema:
      type: string
  responses:
    '200':
      description: OK (Successful get all of the active resources for the AF)
      content:
        application/json:
          schema:
            type: array
            items:
              $ref: '#/components/schemas/LpiParametersProvision'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29122_CommonData.yaml#/components/responses/406'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

post:
  summary: Creates a new LPI Parameters Provisioning resource
  tags:
    - LPI Parameters Provisionings
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
  requestBody:
    description: new resource creation
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/LpiParametersProvision'
  responses:
    '201':
      description: Created (Successful creation)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/LpiParametersProvision'
      headers:
        Location:
          description: 'Contains the URI of the newly created resource'
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':

```



```

    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/provisionedLpis/{provisionedLpiId}:
  get:
    summary: read an active LPI Parameters Provisioning resource for the AF and the provisioned
LPI Id
    tags:
      - Individual LPI Parameters Provisioning
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: provisionedLpiId
        in: path
        description: Identifier of the provisioned LPI parameter resource
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK (Successful get the active resource)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LpiParametersProvision'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  put:
    summary: Updates/replaces an existing LPI Parameters Provisioning resource
    tags:
      - Individual LPI Parameters Provisioning
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: provisionedLpiId
        in: path
        description: Identifier of the provisioned LPI parameter resource
        required: true
        schema:
          type: string

```

```

requestBody:
  description: Parameters to update/replace the existing resource
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/LpiParametersProvision'
responses:
  '200':
    description: OK (Successful update of the existing resource)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/LpiParametersProvision'
  '204':
    description: >
      Successful case. The resource has been successfully updated and no additional
      content is sent in the response message.
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing LPI Parameters Provisioning resource
  tags:
    - Individual LPI Parameters Provisioning
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: provisionedLpiId
      in: path
      description: Identifier of the provisioned LPI parameter resource
      required: true
      schema:
        type: string
  responses:
    '204':
      description: No Content (Successful deletion of the existing resource)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':

```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    LpiParametersProvision:
      type: object
      properties:
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        exteGroupId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        lpi:
          $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/Lpi'
        mtcProviderId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - lpi
        - suppFeat

```

---

## A.9 ServiceParameter API

```

openapi: 3.0.0
info:
  title: 3gpp-service-parameter
  version: 1.0.3
  description: |
    API for AF service parameter
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.13.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}/3gpp-service-parameter/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
    get:
      summary: read all of the active subscriptions for the AF
      tags:
        - Service Parameter Subscriptions
      responses:
        '200':
          description: OK.
          content:

```

```

    application/json:
      schema:
        type: array
        items:
          $ref: '#/components/schemas/ServiceParameterData'
        minItems: 0
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

post:
  summary: Creates a new subscription resource
  tags:
    - Service Parameter Subscriptions
  requestBody:
    description: Request to create a new subscription resource
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/ServiceParameterData'
  responses:
    '201':
      description: Created (Successful creation of subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ServiceParameterData'
      headers:
        Location:
          description: 'Contains the URI of the newly created resource'
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/subscriptions/{subscriptionId}:
  parameters:

```

```
- name: afId
  in: path
  description: Identifier of the AF
  required: true
  schema:
    type: string
- name: subscriptionId
  in: path
  description: Identifier of the subscription resource
  required: true
  schema:
    type: string
get:
  summary: read an active subscriptions for the SCS/AS and the subscription Id
  tags:
    - Individual Service Parameter Subscription
  responses:
    '200':
      description: OK (Successful get the active subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ServiceParameterData'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29122_CommonData.yaml#/components/responses/406'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
put:
  summary: Updates/replaces an existing subscription resource
  tags:
    - Individual Service Parameter Subscription
  requestBody:
    description: Parameters to update/replace the existing subscription
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/ServiceParameterData'
  responses:
    '200':
      description: OK (Successful update of the subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ServiceParameterData'
    '204':
      description: OK (Successful update of the subscription)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
```

```
'411':
  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
```

patch:

- summary: Updates/replaces an existing subscription resource
- tags:
  - Individual Service Parameter Subscription
- requestBody:
  - required: true
  - content:
    - application/merge-patch+json:
      - schema:
        - \$ref: '#/components/schemas/ServiceParameterDataPatch'
- responses:
  - '200':
    - description: OK. The subscription was modified successfully.
    - content:
      - application/json:
        - schema:
          - \$ref: '#/components/schemas/ServiceParameterData'
  - '204':
    - description: OK. The subscription was modified successfully.
  - '307':
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/307'
  - '308':
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/308'
  - '400':
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/400'
  - '401':
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/401'
  - '403':
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/403'
  - '404':
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/404'
  - '411':
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/411'
  - '413':
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/413'
  - '415':
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/415'
  - '429':
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/429'
  - '500':
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/500'
  - '503':
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/503'
  - default:
    - \$ref: 'TS29122\_CommonData.yaml#/components/responses/default'

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

## components:

## securitySchemes:

```

  oAuth2ClientCredentials:
    type: oauth2
    flows:
      clientCredentials:
        tokenUrl: '{tokenUrl}'
        scopes: {}

```

## schemas:

```

  ServiceParameterData:
    type: object
    properties:
      afServiceId:
        type: string
        description: Identifies a service on behalf of which the AF is issuing the request.
      appId:
        type: string
        description: Identifies an application.
      dnn:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
      snssai:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
      externalGroupId:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
      anyUeInd:
        type: boolean
        description: >
          Identifies whether the AF request applies to any UE. This attribute shall set to "true"
          if applicable for any UE, otherwise, set to "false".
      gpsi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      ueIpv4:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
      ueIpv6:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
      ueMac:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
      self:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
      paramOverPc5:
        $ref: '#/components/schemas/ParameterOverPc5'
      paramOverUu:
        $ref: '#/components/schemas/ParameterOverUu'
      mtcProviderId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  ServiceParameterDataPatch:
    type: object
    properties:
      paramOverPc5:
        $ref: '#/components/schemas/ParameterOverPc5Rm'
      paramOverUu:
        $ref: '#/components/schemas/ParameterOverUuRm'
  ParameterOverPc5:
    type: string
  ParameterOverPc5Rm:
    type: string
    nullable: true
  ParameterOverUu:
    type: string
  ParameterOverUuRm:
    type: string
    nullable: true

```

## A.10 ACSParameterProvision API

```

openapi: 3.0.0
info:
  title: 3gpp-acs-pp
  version: 1.0.1
  description: |
    API for 5G ACS Parameter Provision.
    © 2021, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.7.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}/3gpp-acs-pp/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      tags:
        - ACS Configuration Subscriptions
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      responses:
        '200':
          description: OK (Successful get all of the active subscriptions for the AF)
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/AcsConfigurationData'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    post:
      summary: Creates a new subscription resource
      tags:
        - ACS Configuration Subscriptions
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true

```



```

    schema:
      type: string
  requestBody:
    description: new subscription creation
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AcsConfigurationData'
  responses:
    '201':
      description: Created (Successful creation)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AcsConfigurationData'
      headers:
        Location:
          description: 'Contains the URI of the newly created resource'
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/subscriptions/{subscriptionId}:
  get:
    summary: read an active subscription for the AF and the subscription Id
    tags:
      - Individual ACS Configuration Subscription
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: subscriptionId
        in: path
        description: Identifier of the subscription resource
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK (Successful get the active subscription)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AcsConfigurationData'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'

```

```

'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'406':
  $ref: 'TS29122_CommonData.yaml#/components/responses/406'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
  summary: Updates/replaces an existing subscription resource
  tags:
    - Individual ACS Configuration Subscription
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  requestBody:
    description: Parameters to update/replace the existing subscription
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AcsConfigurationData'
  responses:
    '200':
      description: OK (Successful update of the existing subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AcsConfigurationData'
    '204':
      description: Successful case. The resource has been successfully updated and no additional
content is to be sent in the response message.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing subscription

```

```

tags:
- Individual ACS Configuration Subscription
parameters:
- name: afId
  in: path
  description: Identifier of the AF
  required: true
  schema:
    type: string
- name: subscriptionId
  in: path
  description: Identifier of the subscription resource
  required: true
  schema:
    type: string
responses:
'204':
  description: No Content (Successful deletion of the existing subscription)
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    AcsConfigurationData:
      type: object
      properties:
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        exterGroupId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        acsInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AcsInfo'
        mtcProviderId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - acsInfo
        - suppFeat

```

---

## A.11 MoLcsNotify API

openapi: 3.0.0

info:

title: 3gpp-mo-lcs-notify

version: 1.0.1

description: |

API for UE updated location information notification.

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```

    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.7.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - OAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}/3gpp-mo-lcs-notify/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /:
    post:
      summary: UE location information update notification
      tags:
        - AF level UE location update notification operation
      requestBody:
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LocUpdateData'
            required: true
      responses:
        '200':
          description: Success
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/LocUpdateDataReply'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
components:
  securitySchemes:
    OAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    LocUpdateData:
      type: object
      properties:
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        locInfo:
          $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
        lcsQosClass:
          $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/LcsQosClass'
        svcId:
          $ref: 'TS29515_Ngmlc_Location.yaml#/components/schemas/ServiceIdentity'

```

```
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - gpsi
    - lcsQosClass
    - locInfo
    - suppFeat
LocUpdateDataReply:
  type: object
  properties:
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - suppFeat
```

## Annex B (informative): Change history

| Change history |         |           |      |     |     |  |        |
|----------------|---------|-----------|------|-----|-----|--|--------|
| Date           | Meeting | TDoc.     | CR   | Rev | Cat | Subject/Comment  | New    |
| 2018-03        | CT3#95  |           |      |     |     | TS Skeleton  | 0.0.0  |
| 2018-03        | CT3#95  |           |      |     |     | Inclusion of C3-181332 and TS skeleton of Network Exposure Function Northbound APIs in C3-181362.  | 0.1.0  |
| 2018-04        | CT3#96  |           |      |     |     | Inclusion of C3-182407, C3-182408, C3-182504, C3-182418, C3-182505, C3-182443, C3-182421, C3-182422, C3-182501 and editorial changes from Rapporteur.            | 0.2.0  |
| 2018-05        | CT3#97  |           |      |     |     | Inclusion of C3-183187, C3-183773, C3-183774, C3-183553, C3-183826, C3-183329, C3-183776, C3-183827, C3-183778, C3-183605 and editorial changes from Rapporteur. | 0.3.0  |
| 2018-06        | CT#80   |           |      |     |     | TS sent to plenary for approval  | 1.0.0  |
| 2018-06        | CT#80   |           |      |     |     | TS approved by plenary   | 15.0.0 |
| 2018-09        | CT#81   | CP-182015 | 0001 | 1   | F   | DNAI change notification type  | 15.1.0 |
| 2018-09        | CT#81   | CP-182015 | 0002 | -   | F   | Corrections on NEF Northbound interface  | 15.1.0 |
| 2018-09        | CT#81   | CP-182015 | 0003 | 1   | F   | TrafficInfluence API OpenAPI schema  | 15.1.0 |
| 2018-09        | CT#81   | CP-182015 | 0004 | 4   | F   | AF influence traffic routing cleanup   | 15.1.0 |
| 2018-09        | CT#81   | CP-182031 | 0005 | 1   | F   | Definition of Changing the Chargeable Party procedures and API   | 15.1.0 |
| 2018-09        | CT#81   | CP-182031 | 0006 | 1   | F   | Definition of setting up an AS session with required QoS procedure and API   | 15.1.0 |
| 2018-09        | CT#81   | CP-182015 | 0007 | 2   | F   | Resource structure update  | 15.1.0 |
| 2018-09        | CT#81   | CP-182015 | 0008 | -   | F   | Procedures for monitoring – Reference  | 15.1.0 |
| 2018-09        | CT#81   | CP-182015 | 0009 | -   | F   | Ethernet packet filter for AF traffic influence API  | 15.1.0 |
| 2018-09        | CT#81   | CP-182015 | 0010 | 3   | F   | Removable attribute definition for AF traffic influence  | 15.1.0 |
| 2018-09        | CT#81   | CP-182015 | 0011 | -   | F   | Supported feature for AF traffic influence   | 15.1.0 |
| 2018-09        | CT#81   | CP-182015 | 0012 | -   | F   | Version numbering change   | 15.1.0 |
| 2018-09        | CT#81   | CP-182015 | 0013 | -   | F   | Removal of externaldocs field  | 15.1.0 |
| 2018-09        | CT#81   | CP-182035 | 0014 | 1   | F   | PFD Management Service Operation   | 15.1.0 |
| 2018-12        | CT#82   | CP-183205 | 0015 | 2   | F   | ExternalDocs field   | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0016 | 3   | F   | Support of 5G location requirement   | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0017 | 3   | F   | Error status codes for HTTP responses  | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0019 | -   | F   | Default value for apiRoot  | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0021 | 4   | F   | Correct traffic route and Ethernet flow data type  | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0022 | 1   | F   | Event correction for AF influence traffic routing  | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0023 | 2   | F   | Correction to the AF influence on traffic steering control   | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0024 | 1   | F   | Supporting Ethernet UE in Chargeable Party and AF session with QoS   | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0025 | 1   | F   | Add AF application ID for traffic influence  | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0026 | 1   | F   | Add BSF interaction for Chargeable Party and Required QoS  | 15.2.0 |
| 2018-12        | CT#82   | CP-183109 | 0027 | 2   | F   | Security adaptation for Nnef northbound APIs with CAPIF  | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0028 | 2   | F   | Security field   | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0029 | 1   | F   | Corrections on subscribed event  | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0030 | 1   | F   | Status code update for TrafficInfluence API  | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0031 | 3   | F   | UE information during notification   | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0032 | -   | F   | Location header  | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0033 | 1   | F   | API Version Update   | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0034 | 1   | F   | Support of 5G SUPI-PEI association   | 15.2.0 |
| 2018-12        | CT#82   | CP-183205 | 0035 | 1   | F   | Default value for appReloInd and minItem for tempValidities  | 15.2.0 |
| 2019-03        | CT#83   | CP-190116 | 0037 | 2   | F   | Event notification   | 15.3.0 |
| 2019-03        | CT#83   | CP-190116 | 0038 | 1   | F   | Correction on MacAddr48 and RouteToLocation data type reference in the OpenAPI file  | 15.3.0 |
| 2019-03        | CT#83   | CP-190116 | 0040 | 1   | F   | Correction on 5G feature   | 15.3.0 |
| 2019-03        | CT#83   | CP-190116 | 0041 | -   | F   | Open API version number update   | 15.3.0 |
| 2019-06        | CT#84   | CP-191080 | 0042 | 4   | F   | Resource structure and AF Identifier   | 15.4.0 |
| 2019-06        | CT#84   | CP-191080 | 0048 | 2   | F   | UDM interaction for AF influence traffic   | 15.4.0 |
| 2019-06        | CT#84   | CP-191080 | 0049 | 2   | F   | Correct condition for DNAI in UP path change   | 15.4.0 |
| 2019-06        | CT#84   | CP-191080 | 0053 | 1   | F   | Precedence of OpenAPI file   | 15.4.0 |
| 2019-06        | CT#84   | CP-191080 | 0059 | 1   | F   | Copyright Note in YAML file  | 15.4.0 |
| 2019-06        | CT#84   | CP-191080 | 0060 | 2   | F   | API version Update   | 15.4.0 |
| 2019-06        | CT#84   | CP-191070 | 0043 | 2   | F   | Nnef_MSISDN-less_MO_SMS service  | 16.0.0 |
| 2019-06        | CT#84   | CP-191070 | 0044 | 2   | B   | Application function notification of downlink data delivery status   | 16.0.0 |
| 2019-06        | CT#84   | CP-191070 | 0045 | 2   | B   | Availability after DDN failure notification for multiple Afs   | 16.0.0 |
| 2019-06        | CT#84   | CP-191090 | 0047 | 1   | F   | Support of external group Id   | 16.0.0 |
| 2019-06        | CT#84   | CP-191070 | 0050 | 2   | B   | Network parameter provisioning support   | 16.0.0 |
| 2019-06        | CT#84   | CP-191070 | 0051 | 3   | F   | NIDD configuration and delivery in 5G  | 16.0.0 |
| 2019-06        | CT#84   | CP-191229 | 0054 | 5   | B   | AF acknowledgement to be expected  | 16.0.0 |
| 2019-06        | CT#84   | CP-191071 | 0055 | 2   | B   | UE IP address preservation indication  | 16.0.0 |

|         |         |           |      |   |   |  |        |
|---------|---------|-----------|------|---|---|--|--------|
| 2019-06 | CT#84   | CP-191104 | 0056 | 1 | B | PFD management notification  | 16.0.0 |
| 2019-06 | CT#84   | CP-191100 | 0057 | 1 | B | NEF stored exposure data   | 16.0.0 |
| 2019-06 | CT#84   | CP-191105 | 0058 | 1 | B | BDT Warning Notification Support                                     | 16.0.0 |
| 2019-06 | CT#84   | CP-191101 | 0061 | 1 | F | API version update   | 16.0.0 |
| 2019-09 | CT#85   | CP-192137 | 0063 | 1 | F | Resolving EN in NIDD   | 16.1.0 |
| 2019-09 | CT#85   | CP-192156 | 0064 | 1 | B | Support a set of MAC addresses in traffic filter                     | 16.1.0 |
| 2019-09 | CT#85   | CP-192165 | 0066 | 1 | B | Support parameter provisioning in RACS                               | 16.1.0 |
| 2019-09 | CT#85   | CP-192157 | 0067 | 2 | B | Accurate UE moving trajectory definition                             | 16.1.0 |
| 2019-09 | CT#85   | CP-192157 | 0069 | 2 | B | Procedures for Nnef_AnalyticsExposure Service                        | 16.1.0 |
| 2019-09 | CT#85   | CP-192157 | 0070 | 2 | B | API definition for Nnef_AnalyticsExposure Service                    | 16.1.0 |
| 2019-09 | CT#85   | CP-192170 | 0071 | 1 | B | Procedures for 5G LAN type sevice over northbound interface          | 16.1.0 |
| 2019-09 | CT#85   | CP-192170 | 0072 | 2 | B | API definition for 5G LAN type sevice over northbound interface      | 16.1.0 |
| 2019-09 | CT#85   | CP-192169 | 0073 | 3 | B | PFD management partial failure                                       | 16.1.0 |
| 2019-09 | CT#85   | CP-192157 | 0074 | 1 | B | Cancel the BDT warning notification                                  | 16.1.0 |
| 2019-09 | CT#85   | CP-192219 | 0075 | 2 | B | Notification of downlink data delivery status                        | 16.1.0 |
| 2019-09 | CT#85   | CP-192179 | 0076 | 2 | B | Applying BDT policy  | 16.1.0 |
| 2019-09 | CT#85   | CP-192152 | 0077 | 2 | B | API definition for Nnef_IPTVconfiguration service                    | 16.1.0 |
| 2019-09 | CT#85   | CP-192137 | 0079 | - | B | Nnef_ECRestriction service   | 16.1.0 |
| 2019-09 | CT#85   | CP-192137 | 0080 | - | B | Differences between EPC and 5GC                                      | 16.1.0 |
| 2019-09 | CT#85   | CP-192158 | 0081 | 1 | F | Service consumer description Corrections                             | 16.1.0 |
| 2019-09 | CT#85   | CP-192138 | 0082 | 2 | B | AF acknowledgement of UP path event notification                     | 16.1.0 |
| 2019-09 | CT#85   | CP-192138 | 0083 | - | B | Successful AF acknowledgement without N6 traffic routing information | 16.1.0 |
| 2019-09 | CT#85   | CP-192173 | 0084 | - | F | OpenAPI version update TS 29.522 R-16                                | 16.1.0 |
| 2019-09 | CT#85   | CP-192251 | 0085 | 1 | B | Procedures for Nnef_IPTVconfiguration service                        | 16.1.0 |
| 2019-12 | CT#86   | CP-193179 | 0086 | 1 | B | Nnef_APISupportCapability Service                                    | 16.2.0 |
| 2019-12 | CT#86   | CP-193181 | 0087 | - | B | OpenAPI file update to support AF acknowledgement                    | 16.2.0 |
| 2019-12 | CT#86   | CP-193179 | 0088 | 1 | B | Scheduled communication type   | 16.2.0 |
| 2019-12 | CT#86   | CP-193181 | 0089 | 1 | B | Open issue for AddrPreservation feature                              | 16.2.0 |
| 2019-12 | CT#86   | CP-193222 | 0090 | 1 | B | Partial update for 5GLANParameterProvision API                       | 16.2.0 |
| 2019-12 | CT#86   | CP-193222 | 0091 | 2 | B | OpenAPI file for 5GLANParameterProvision API                         | 16.2.0 |
| 2019-12 | CT#86   | CP-193191 | 0092 | 3 | F | Clarify multicast access control                                     | 16.2.0 |
| 2019-12 | CT#86   | CP-193222 | 0093 | 1 | F | Clarify the procedure for 5GLAN parameter provisioning               | 16.2.0 |
| 2019-12 | CT#86   | CP-193223 | 0094 | - | F | Correct resource URI for xBDT  | 16.2.0 |
| 2019-12 | CT#86   | CP-193220 | 0096 | 4 | B | PFD partial failure notification                                     | 16.2.0 |
| 2019-12 | CT#86   | CP-193223 | 0097 | 1 | F | Correction to HTTP methods used to update BDT policy                 | 16.2.0 |
| 2019-12 | CT#86   | CP-193191 | 0099 | 1 | B | Partial update of IPTVConfiguration API                              | 16.2.0 |
| 2019-12 | CT#86   | CP-193191 | 0100 | 2 | B | OpenAPI file of IPTVConfiguration API                                | 16.2.0 |
| 2019-12 | CT#86   | CP-193198 | 0101 | 3 | B | AnalyticsEventNotif and AnalyticsExposureSubsc Data Types            | 16.2.0 |
| 2019-12 | CT#86   | CP-193198 | 0102 | - | B | Open issue for AnalyticsEvent data type                              | 16.2.0 |
| 2019-12 | CT#86   | CP-193198 | 0103 | 1 | B | Partial update of Nnef_AnalyticsExposure API                         | 16.2.0 |
| 2019-12 | CT#86   | CP-193198 | 0104 | 2 | B | Nnef_AnalyticsExposure_fetch service operation                       | 16.2.0 |
| 2019-12 | CT#86   | CP-193181 | 0105 | - | F | Correct the condition for AF relocation acknowledgement              | 16.2.0 |
| 2019-12 | CT#86   | CP-193199 | 0106 | - | F | UI structure for N33 APIs  | 16.2.0 |
| 2019-12 | CT#86   | CP-193198 | 0107 | - | B | OpenAPI file for AnalyticsExposure API                               | 16.2.0 |
| 2019-12 | CT#86   | CP-193222 | 0108 | 1 | D | Corrections on 5GLANParameterProvision API                           | 16.2.0 |
| 2019-12 | CT#86   | CP-193181 | 0109 | - | F | Definition of AfResultInfo in OpenAPI                                | 16.2.0 |
| 2019-12 | CT#86   | CP-193212 | 0110 | 1 | F | Update of API version and TS version in OpenAPI file                 | 16.2.0 |
| 2019-12 | CT#86   | CP-193188 | 0112 | 1 | A | make the storage of traffic influence request in the UDR mandatory   | 16.2.0 |
| 2019-12 | CT#86   | CP-193223 | 0113 | 1 | F | missnging required in ApplyingBdtPolicy API file                     | 16.2.0 |
| 2019-12 | CT#86   | CP-193188 | 0115 | - | A | Correct cardinality in traffic influence                             | 16.2.0 |
| 2019-12 | CT#86   | CP-193198 | 0116 | 1 | F | openAPI correction for ExNotification                                | 16.2.0 |
| 2020-03 | CT#87-e | CP-200207 | 0118 | - | B | DNN Clarification  | 16.3.0 |
| 2020-03 | CT#87-e | CP-200198 | 0119 | 1 | B | Update of the Availability after DDN Failure event                   | 16.3.0 |
| 2020-03 | CT#87-e | CP-200198 | 0120 | 1 | B | Update of the DDD status event                                       | 16.3.0 |
| 2020-03 | CT#87-e | CP-200212 | 0122 | 1 | B | Procedure of Nnef_ServiceParameter service                           | 16.3.0 |
| 2020-03 | CT#87-e | CP-200212 | 0123 | 1 | B | Resources and data types of Nnef_ServiceParameter service            | 16.3.0 |
| 2020-03 | CT#87-e | CP-200266 | 0124 | 3 | B | OpenAPI file of Nnef_ServiceParameter service                        | 16.3.0 |
| 2020-03 | CT#87-e | CP-200202 | 0125 | 1 | B | QoS Monitoring Report  | 16.3.0 |
| 2020-03 | CT#87-e | CP-200218 | 0126 | 1 | B | Indication of traffic correlation                                    | 16.3.0 |
| 2020-03 | CT#87-e | CP-200203 | 0127 | 1 | B | Clarification of IPTV configuration                                  | 16.3.0 |
| 2020-03 | CT#87-e | CP-200198 | 0128 | - | F | Correct TS number for NEF southbound NIDD service                    | 16.3.0 |
| 2020-03 | CT#87-e | CP-200198 | 0129 | - | B | Support PDU session status   | 16.3.0 |
| 2020-03 | CT#87-e | CP-200137 | 0130 | 2 | F | Correct UE mobility and communication                                | 16.3.0 |
| 2020-03 | CT#87-e | CP-200208 | 0131 | 1 | B | Support network performance analytics                                | 16.3.0 |
| 2020-03 | CT#87-e | CP-200208 | 0132 | 1 | B | Support BDT policy candidates in notification                        | 16.3.0 |
| 2020-03 | CT#87-e | CP-200212 | 0133 | 1 | B | Add alternative QoS requirements                                     | 16.3.0 |



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| 2020-03 | CT#87-e | CP-200142 | 0134 | 2 | B | Support QoS sustainability analytics   | 16.3.0 |
| 2020-03 | CT#87-e | CP-200218 | 0135 | - | F | Definition of 5GLanParametersProvision   | 16.3.0 |
| 2020-03 | CT#87-e | CP-200203 | 0136 | - | F | Definition of lptvConfigData   | 16.3.0 |
| 2020-03 | CT#87-e | CP-200219 | 0137 | - | F | Usage of the "bdtReflid" property  | 16.3.0 |
| 2020-03 | CT#87-e | CP-200215 | 0138 | - | F | Miscellaneous errors   | 16.3.0 |
| 2020-03 | CT#87-e | CP-200199 | 0140 | 3 | B | UE Location Privacy Setting in NEF   | 16.3.0 |
| 2020-03 | CT#87-e | CP-200237 | 0142 | 2 | B | AnalyticsExposure API, Analytics Event Filter associated with all events         | 16.3.0 |
| 2020-03 | CT#87-e | CP-200208 | 0143 | 1 | B | AnalyticsExposure API, support of abnormal behaviour                             | 16.3.0 |
| 2020-03 | CT#87-e | CP-200208 | 0144 | 1 | B | AnalyticsExposure API, support of data congestion                                | 16.3.0 |
| 2020-03 | CT#87-e | CP-200216 | 0145 | - | F | 29.522 Rel-16 Update of OpenAPI version and TS version in externalDocs field     | 16.3.0 |
| 2020-03 | CT#87-e | CP-200259 | 0146 | - | F | LpiParameterProvision API update for LPI parameters provisioning                 | 16.3.0 |
| 2020-06 | CT#88-e | CP-201243 | 0148 | 1 | F | Missing mapping in the overview  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201238 | 0149 | 2 | F | Wrong datatypes Datatime and Plmn  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201234 | 0150 | - | F | Wrong datatype referred in analytics exposure procedure                          | 16.4.0 |
| 2020-06 | CT#88-e | CP-201228 | 0151 | 1 | B | Procedure of ACS Information Configuration                                       | 16.4.0 |
| 2020-06 | CT#88-e | CP-201228 | 0152 | 1 | B | Resources and data types of Nnef_ACSPParameterProvision service                  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201339 | 0153 | 4 | B | OpenAPI file of Nnef_ACSPParameterProvision service                              | 16.4.0 |
| 2020-06 | CT#88-e | CP-201235 | 0159 | 1 | F | Loss of connectivity reason  | 16.4.0 |
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| 2020-06 | CT#88-e | CP-201252 | 0162 | 1 | F | Correction to 5GLANParameterProvision API  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201228 | 0163 | 1 | F | Correction to IPTVConfiguration API  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201253 | 0164 | 1 | F | Correction to ApplyingBdtPolicy API  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201252 | 0165 | 1 | F | Open issue for 5GLanParametersProvisionPatch                                     | 16.4.0 |
| 2020-06 | CT#88-e | CP-201195 | 0167 | 6 | B | Supporting the Location Services in NEF in TS 29.522                             | 16.4.0 |
| 2020-06 | CT#88-e | CP-201235 | 0169 | 1 | A | Periodic reporting by Nnef   | 16.4.0 |
| 2020-06 | CT#88-e | CP-201252 | 0170 | 3 | F | Clarify nullable attributes used in PATCH  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201244 | 0171 | 1 | F | Storage of YAML files in ETSI Forge  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201178 | 0172 | 2 | F | Confidence of analytics results for Nnef_AnalyticsExposure service               | 16.4.0 |
| 2020-06 | CT#88-e | CP-201238 | 0173 | - | B | Complete ServiceParameter API  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201276 | 0174 | 1 | F | Traffic descriptor for xBDT  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201213 | 0175 | 1 | F | Corrections related to URLLC   | 16.4.0 |
| 2020-06 | CT#88-e | CP-201228 | 0177 | - | F | Clarify unmodifiable attribute in PUT  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201234 | 0178 | 1 | F | Optional target UE   | 16.4.0 |
| 2020-06 | CT#88-e | CP-201246 | 0179 | 1 | F | Move 5G specific procedure to TS 29.522  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201210 | 0180 | 1 | F | Interaction with UDM for Enhanced Coverage Restriction Control                   | 16.4.0 |
| 2020-06 | CT#88-e | CP-201210 | 0181 | 1 | B | Support of Enhanced Coverage Mode control  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201234 | 0182 | - | F | Support of immediate reporting for Nnef_AnalyticsExposure service                | 16.4.0 |
| 2020-06 | CT#88-e | CP-201246 | 0183 | 1 | F | Corrections to apiVersion  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201246 | 0184 | 1 | F | Corrections to error status code   | 16.4.0 |
| 2020-06 | CT#88-e | CP-201274 | 0185 | 1 | B | AF provides AAA server address   | 16.4.0 |
| 2020-06 | CT#88-e | CP-201246 | 0186 | 1 | F | Updates to IP address  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201234 | 0187 | 2 | F | Update to reporting information  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201234 | 0188 | 1 | F | Ratio of analytics results for Nnef_AnalyticsExposure service                    | 16.4.0 |
| 2020-06 | CT#88-e | CP-201234 | 0189 | - | F | Supported features definition for Nnef_AnalyticsExposure service                 | 16.4.0 |
| 2020-06 | CT#88-e | CP-201234 | 0190 | 1 | F | Corrections on target UE information for Nnef_AnalyticsExposure service          | 16.4.0 |
| 2020-06 | CT#88-e | CP-201246 | 0191 | 1 | F | Corrections on tags field for NEF Northbound APIs                                | 16.4.0 |
| 2020-06 | CT#88-e | CP-201234 | 0192 | 1 | F | Support of network performance for Nnef_AnalyticsExposure service                | 16.4.0 |
| 2020-06 | CT#88-e | CP-201234 | 0193 | 1 | F | Data type used in fetch the analytics  | 16.4.0 |
| 2020-06 | CT#88-e | CP-201235 | 0194 | 1 | F | Supported headers, Resource Data type and Operation Name                         | 16.4.0 |
| 2020-06 | CT#88-e | CP-201255 | 0195 | - | F | Update of OpenAPI version and TS version in externalDocs field                   | 16.4.0 |
| 2020-06 | CT#88-e | CP-201336 | 0196 | 1 | F | Remove the Abnormal_Behaviour applicability for ueMobilityInfos in AnalyticsData | 16.4.0 |
| 2020-09 | CT#89-e | CP-202077 | 0199 | - | F | Remove 5G procedures from TS 29.122  | 16.5.0 |
| 2020-09 | CT#89-e | CP-202048 | 0200 | - | F | Corrections on NiddConfigurationTrigger API                                      | 16.5.0 |
| 2020-09 | CT#89-e | CP-202048 | 0201 | - | F | Support PDU session status   | 16.5.0 |
| 2020-09 | CT#89-e | CP-202059 | 0202 | - | F | Missed Location header table   | 16.5.0 |
| 2020-09 | CT#89-e | CP-202066 | 0203 | - | F | Zero confidence  | 16.5.0 |
| 2020-09 | CT#89-e | CP-202059 | 0206 | - | F | URI of ACSParameterProvision API   | 16.5.0 |
| 2020-09 | CT#89-e | CP-202069 | 0207 | - | F | Subscription creation  | 16.5.0 |

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| 2020-09 | CT#89-e | CP-202069 | 0208 | 1 | F | Resource correction  | 16.5.0 |
| 2020-09 | CT#89-e | CP-202066 | 0209 | - | F | Validity period for analytics information                                    | 16.5.0 |
| 2020-09 | CT#89-e | CP-202081 | 0210 | - | F | 5G LAN Parameter Provisioning  | 16.5.0 |
| 2020-09 | CT#89-e | CP-202066 | 0211 | - | F | Omitted event reporting information  | 16.5.0 |
| 2020-09 | CT#89-e | CP-202082 | 0212 | 1 | F | Reading all subscriptions in ApplyingBdtPolicy API                           | 16.5.0 |
| 2020-09 | CT#89-e | CP-202082 | 0213 | 1 | F | Resource URI corrections   | 16.5.0 |
| 2020-09 | CT#89-e | CP-202066 | 0214 | 1 | F | Ratio and confidence for UE mobility   | 16.5.0 |
| 2020-09 | CT#89-e | CP-202066 | 0215 | - | F | Extra reporting requirement  | 16.5.0 |
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| 2020-09 | CT#89-e | CP-202066 | 0217 | - | F | Applicabilities of snssai, dnn and locArea                                   | 16.5.0 |
| 2020-09 | CT#89-e | CP-202084 | 0218 | - | F | 29.522 Rel-16 Update of OpenAPI version and TS version in externalDocs field | 16.5.0 |
| 2020-12 | CT#90-e | CP-203139 | 0219 | 1 | F | TS 29.522 Essential Corrections and alignments                               | 16.6.0 |
| 2020-12 | CT#90-e | CP-203109 | 0220 | 1 | F | Essential corrections and alignments   | 16.6.0 |
| 2020-12 | CT#90-e | CP-203132 | 0221 | - | F | Correction to Alternative QoS Parameter                                      | 16.6.0 |
| 2020-12 | CT#90-e | CP-203139 | 0222 | - | F | Storage of YAML files in 3GPP Forge  | 16.6.0 |
| 2020-12 | CT#90-e | CP-203111 | 0223 | - | F | array QosMonitoringReport  | 16.6.0 |
| 2020-12 | CT#90-e | CP-203139 | 0224 | 1 | F | Callback URI correction  | 16.6.0 |
| 2020-12 | CT#90-e | CP-203108 | 0227 | - | F | Difference between 4G and 5G for ECRControl API                              | 16.6.0 |
| 2020-12 | CT#90-e | CP-203108 | 0228 | - | F | PDU session status   | 16.6.0 |
| 2020-12 | CT#90-e | CP-203118 | 0231 | 1 | A | Solve IP address overlapping for AF traffic influence                        | 16.6.0 |
| 2020-12 | CT#90-e | CP-203129 | 0232 | 1 | F | Corrections to Subscription Request in AnalyticsExposure API                 | 16.6.0 |
| 2020-12 | CT#90-e | CP-203129 | 0233 | 1 | F | Correction to appld exposed in AnalyticsExposure API                         | 16.6.0 |
| 2020-12 | CT#90-e | CP-203152 | 0236 | - | F | Update of OpenAPI version and TS version in externalDocs field               | 16.6.0 |
| 2021-03 | CT#91-e | CP-210202 | 0237 | - | F | Correct presence condition in ACS provisioning procedure                     | 16.7.0 |
| 2021-03 | CT#91-e | CP-210210 | 0239 | 1 | F | Correct AlternativeQoS_5G description  | 16.7.0 |
| 2021-03 | CT#91-e | CP-210210 | 0241 | 1 | F | Correct service parameter provisioning procedure                             | 16.7.0 |
| 2021-03 | CT#91-e | CP-210210 | 0243 | 1 | F | Correction to alternative QoS paramter report                                | 16.7.0 |
| 2021-03 | CT#91-e | CP-210210 | 0245 | 2 | F | Disable UE notifications at changes related to Alternative QoS Profiles      | 16.7.0 |
| 2021-03 | CT#91-e | CP-210192 | 0247 | 1 | F | QoS monitoring report during the PDU session termination                     | 16.7.0 |
| 2021-03 | CT#91-e | CP-210192 | 0249 | 1 | F | Change of notification URI   | 16.7.0 |
| 2021-03 | CT#91-e | CP-210207 | 0253 | 1 | F | Last known location report   | 16.7.0 |
| 2021-03 | CT#91-e | CP-210207 | 0256 | - | F | Default value of accuarcy  | 16.7.0 |
| 2021-03 | CT#91-e | CP-210208 | 0258 | 3 | F | Support redirection for TrafficInfluence API                                 | 16.7.0 |
| 2021-03 | CT#91-e | CP-210207 | 0260 | - | F | Monitoring expire time   | 16.7.0 |
| 2021-03 | CT#91-e | CP-210237 | 0264 | 1 | F | Correction to mtcProviderId in 5GLANParameterProvision API                   | 16.7.0 |
| 2021-03 | CT#91-e | CP-210190 | 0266 | 1 | F | Correction to mtcProviderId in LpiParameterProvision API                     | 16.7.0 |
| 2021-03 | CT#91-e | CP-210206 | 0276 | 1 | F | Failure events for AnalyticsExposure API                                     | 16.7.0 |
| 2021-03 | CT#91-e | CP-210208 | 0279 | 1 | F | Support redirection for 5GLANParameterProvision API                          | 16.7.0 |
| 2021-03 | CT#91-e | CP-210208 | 0281 | 1 | F | Support redirection for ACSParameterProvision API                            | 16.7.0 |
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| 2021-03 | CT#91-e | CP-210209 | 0285 | 1 | F | Support redirection for ApplyingBdtPolicy API                                | 16.7.0 |
| 2021-03 | CT#91-e | CP-210209 | 0287 | 1 | F | Support redirection for IPTVConfiguration API                                | 16.7.0 |
| 2021-03 | CT#91-e | CP-210209 | 0289 | 1 | F | Support redirection for LpiParameterProvision API                            | 16.7.0 |
| 2021-03 | CT#91-e | CP-210209 | 0291 | 1 | F | Support redirection for MoLcsNotify API                                      | 16.7.0 |
| 2021-03 | CT#91-e | CP-210209 | 0293 | 1 | F | Support redirection for NiddConfigurationTrigger API                         | 16.7.0 |
| 2021-03 | CT#91-e | CP-210209 | 0295 | 1 | F | Support redirection for ServiceParameter API                                 | 16.7.0 |
| 2021-03 | CT#91-e | CP-210199 | 0298 | - | A | Correction on N5 events for AsSessionWithQoS API                             | 16.7.0 |
| 2021-03 | CT#91-e | CP-210202 | 0301 | 2 | F | Correction to mtcProviderId in IPTVConfiguration API                         | 16.7.0 |
| 2021-03 | CT#91-e | CP-210210 | 0303 | 1 | F | Correction to mtcProviderId in ServiceParameter API                          | 16.7.0 |
| 2021-03 | CT#91-e | CP-210202 | 0305 | 1 | F | Correction to mtcProviderId in ACSParameterProvision API                     | 16.7.0 |
| 2021-03 | CT#91-e | CP-210239 | 0307 | - | F | Update of OpenAPI version and TS version in externalDocs field               | 16.7.0 |
| 2021-06 | CT#92-e | CP-211199 | 0335 | 1 | F | Correction to LDR geographic area  | 16.8.0 |
| 2021-06 | CT#92-e | CP-211207 | 0338 | - | A | Location accuracy  | 16.8.0 |
| 2021-06 | CT#92-e | CP-211220 | 0340 | - | F | Adding description for partial failure operation of AnalyticsExposure API    | 16.8.0 |
| 2021-06 | CT#92-e | CP-211224 | 0343 | - | F | Wrong attribute name in the OpenAPI file                                     | 16.8.0 |
| 2021-06 | CT#92-e | CP-211224 | 0345 | - | F | Data type in 200 OK response to PATCH  | 16.8.0 |
| 2021-06 | CT#92-e | CP-211220 | 0360 | - | F | Consistency for websocket in AnalyticsExposure                               | 16.8.0 |
| 2021-06 | CT#92-e | CP-211264 | 0362 | - | F | Update of OpenAPI version and TS version in externalDocs field               | 16.8.0 |
| 2021-09 | CT#93-e | CP-212202 | 0385 | - | F | Corrections to analytics exposure  | 16.9.0 |
| 2021-09 | CT#93-e | CP-212229 | 0387 | - | F | correction of resource name for ApplyingBdtPolicy API                        | 16.9.0 |
| 2021-09 | CT#93-e | CP-212228 | 0389 | - | F | correction of attribute name of applds                                       | 16.9.0 |
| 2021-09 | CT#93-e | CP-212190 | 0392 | 1 | A | Corrections to TrafficInfluence  | 16.9.0 |
| 2021-09 | CT#93-e | CP-212186 | 0405 | 1 | F | Updates to LCS client type   | 16.9.0 |

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| 2022-03 | CT#95-e | CP-220173 | 0501 | - | F | Correction of reference to 29.500 error codes  | 16.10.0 |
| 2022-03 | CT#95-e | CP-220172 | 0520 | - | F | Correction to MO-LR  | 16.10.0 |
| 2022-03 | CT#95-e | CP-220172 | 0522 | - | F | Correction to MT-LR  | 16.10.0 |
| 2022-03 | CT#95-e | CP-220172 | 0524 | - | F | Correction to Location Privacy Indication Parameters Provisioning  | 16.10.0 |
| 2022-06 | CT#96   | CP-221117 | 0623 | - | F | Correction to UP path notification   | 16.11.0 |
| 2022-06 | CT#96   | CP-221128 | 0625 | 1 | F | value range of confidence  | 16.11.0 |
| 2022-06 | CT#96   | CP-221128 | 0627 | 1 | F | NEF mapping for Analytics Exposure Subscription  | 16.11.0 |
| 2022-09 | CT#97-e | CP-222100 | 0678 | 1 | F | Correction of SUBSCRIPTION_NOT_FOUND   | 16.12.0 |
| 2022-12 | CT#98-e | CP-223161 | 0733 | 1 | F | Correction of the minimum items in the GET response of LpiParametersProvision                                | 16.13.0 |
| 2022-12 | CT#98-e | CP-223175 | 0765 | - | F | Corrections in ServiceParameter API  | 16.13.0 |
| 2022-12 | CT#98-e | CP-223187 | 0766 | - | F | Update of info and externalDocs fields   | 16.13.0 |
| 2023-06 | CT#100  | CP-231172 | 0918 | - | F | Monitoring procedure corrections   | 16.14.0 |
| 2023-09 | CT#101  | CP-232112 | 0994 | - | F | Corrections to external Group ID in ServiceParameter API   | 16.15.0 |
| 2024-03 | CT#103  | CP-240170 | 1192 | 1 | F | Corrections on QoS monitoring reports  | 16.16.0 |
| 2024-06 | CT#104  | CP-241115 | 1261 |   | F | Essential corrections to the PATCH method on the Individual 5GLAN Parameters Provision Subscription resource | 16.17.0 |
| 2024-06 | CT#104  | CP-241130 | 1316 |   | F | Update of info and externalDocs fields   | 16.17.0 |

# History

| <b>Document history</b> |                |             |
|-------------------------|----------------|-------------|
| V16.4.0                 | August 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                | March 2022     | Publication |
| V16.11.0                | July 2022      | Publication |
| V16.12.0                | September 2022 | Publication |
| V16.13.0                | January 2023   | Publication |
| V16.14.0                | July 2023      | Publication |
| V16.15.0                | September 2023 | Publication |
| V16.16.0                | April 2024     | Publication |
| V16.17.0                | July 2024      | Publication |