ETSI TS 129 522 V16.4.0 (2020-08)



5G; 5G System; Network Exposure Function Northbound APIs; Stage 3 (3GPP TS 29.522 version 16.4.0 Release 16)



Reference RTS/TSGC-0329522vg40 Keywords 5G

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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.
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[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 FunctionServices 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 service to multiple AFs.

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

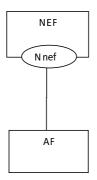


Figure 4.2-1: Reference Architecture for the Nnef Service; SBI representation



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 a 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, 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;
- 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 Location_notification and Number_of_UEs_in_an_area_notification_5G features in the NEF.
- description about the PDN connectivity status event applies to the PDU session status event;
- when sending the UDM/AMF 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 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 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 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 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 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 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, service identifier with the "svcId" attribute, Location deferred requested event type within the "ldrType" attribute, the validity start time and the validity end time in 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 as defined in subclause 5.3.2.3.2 of 3GPP TS 29.122 [4] for location information subscription; 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 privacy from 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 by using 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].

Upon receipt of successful location response from the GMLC or the AMF, the NEF shall create or update the resource and then send HTTP POST or PUT response to the AF as defined in subclause 4.4.2.3 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 and 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 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 5.4.3.3.3.3 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, external Identifier, any UE Indication, the UE IP 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, spatial 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 for an individual UE or perform as described in subclause 4.4.7.3 if the request is for multiple UEs.

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 responds 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 responds 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 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.

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];
- 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 5.3.4 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 4.4.2 of 3GPP TS 29.508 [26] or subclause 4.2.5.14 of 3GPP TS 29.514 [7], the NEF shall include the QoS monitoring report within the "qosMonReport" attribute. Within the QosMonitoringReport data structure, the NEF shall include:
 - one or two uplink packet delays within the "ulDelays" attribute;
 - one or two downlink packet delays within the "dlDelays" attribute; and/or
 - one or two round trip packet delays within the "rtDelays" attribute; and
- if the "AlternativeQoS_5G" feature is supported, the AF may include an ordered list of QoS references within
 the "altQosReferences" attribute. The NEF shall transfer them to the PCF in the Npcf_PolicyAuthorization
 service. The NEF shall also 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.

NOTE: 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.
 - 8) identification of time window to which the subscription applies via identification of date-time(s) as "startTs" and "endTs" attributes; and/or
 - 9) preferred level of accuracy of the analytics as "accuracy" attribute.
- 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.

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 request from the AF, if the AF is authorized, the NEF shall interact with the NWDAF to subscribe 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 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 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.

- 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.
- 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/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 "analyEvents" 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 Subscriptions" 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 External Group Identifier, DNN, S-NSSAI and PDU session type shall remain unchanged from previous values. The body of the HTTP PATCH message shall include the 5GLanParametersProvisionPatch data as defined in subclause 5.7.2.3.5.

Upon receipt 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 Subscriptions" 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 Subscriptions" 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 converage 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.

In order to update an existing analytics exposure subscription, 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 analytics exposure subscription, 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 LpiParameters Provision 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 LpiParameterProvision 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 to 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 servcie 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 "exterGroupId" attribute; or
 - f) identification of any UE within the "anyUeInd" attribute.
- configuration parameters for V2X communication over PC5 within the "paramOverPc5" attribute; and
- configuration parameters for V2X communication over Uu within the "paramOverUu" attribute.

In order to update an existing analytics exposure 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 paramter 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.

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.

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 "204 No Content" status code.

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 5.2.10 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	 The "LocBdt_5G" feature as described in subclause 5.4.4 of 3GPP TS 29.122 [4] may only be supported in 5G. The "Group_Id" feature as described in subclause 5.4.4 of 3GPP TS 29.122 [4] may be supported in 5G. The "BdtNotification_5G" feature as described in subclause 5.4.4 of 3GPP TS 29.122 [4] may only be supported in 5G.
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	 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. 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. 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. 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 InterfaceIndication value "PDN_GATEWAY" stands for PDU session anchored in UPF in 5G. The "eLCS" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.
DeviceTriggering	
CpProvisioning	 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. The "ScheduledCommType_5G" feature as described in subclause 5.10.4 of 3GPP TS 29.122 [4] may only be supported in 5G.
ChargeableParty	 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. The events (i.e. LOSS_OF_BEARER, RECOVERY_OF_BEARER and RELEASE_OF_BEARER) do not apply for 5G.
AsSessionWithQoS	 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. The events (i.e. LOSS_OF_BEARER, RECOVERY_OF_BEARER and RELEASE_OF_BEARER) do not apply for 5G.
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	

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.

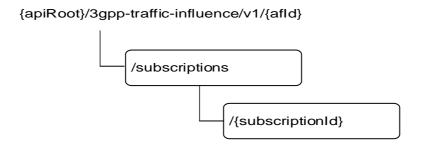


Figure 5.4.1.1-1: Resource URI structure of the TrafficInfluence API

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

Resource URI **HTTP** method Resource name Description Read all subscriptions for a **GET** {apiRoot}/3gpp-trafficgiven AF Traffic Influence Subscription Influence/v1/{afld}/subscriptions Create a new subscription to **POST** traffic influence Read the subscription to the **GET** traffic influence Modify all of the properties of PUT an existing subscription to an {apiRoot}/3gpp-traffic-Individual Traffic Influence traffic influence Influence/v1/{afld}/subscriptions/{s Subscription Modify part of the properties of ubscriptionId} PATCH an existing subscription to an traffic influence Delete the subscription to the DELETE traffic influence

Table 5.4.1.1-1: Resources and methods overview

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 subscribtions 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].
afld	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	Р	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	Р	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	Р	Cardinality	Response	Description		
			codes			
array(TrafficInfluS ub)	М	0N		The subscription information for the AF in the request URI are returned.		

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	Р	Cardinality	Description
TrafficInfluSub	М	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	Р	Cardinality	Response codes	Description
TrafficInfluSub	М	1	201 Created	The subscription was created successfully. 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	Р	Cardinality	Description
Location	string	М	1	Contains the URI of the newly created resource, according to
				the structure: {apiRoot}/3gpp-traffic-
				Influence/v1/{afld}/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].
afld	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	Р	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	Р	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	Р	Cardinality	Response codes	Description		
TrafficInfluSub	М	1		The subscription information for the AF in the request URI are returned.		
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.						

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	Р	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	М	1	200 OK	The subscription was updated successfully.	
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.					

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	Р	Cardinality	Description	
TrafficInfluSubPatch	М	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	М	1	200 OK	The subscription was modified successfully.

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.

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	Р	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	Р	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	Р	Cardinality	Response codes	Description		
N/A			204 No Content	The subscription was terminated successfully.		
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.						

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	Custom operation URI	Mapped HTTP method	Description
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

URI: {notificationDestination}

The operation shall support the URI variables defined in table 5.4.2.2.2-1.

Table 5.4.2.2.2-1: URI variables

Name	Data type	Definition
notificationDestination	Link	Callback reference provided by the AF during creation 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	Р	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	Data type P Cardinality		Cardinality	Response codes	Description	
N/A					The event notification is received successfully.	
				Content		
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					

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

URI: {afAckUri}

The operation shall support the URI variables defined in table 5.4.2.3.2-1.

Table 5.4.2.3.2-1: 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 5.4.2.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	Р	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	Data type P Cardinality Response codes			Description	
N/A					The acknowledgement of event notification is received successfully.
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.					

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.			
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 5.4.4-1.			
TemporalValidity	3GPP TS 29.514 [7]	Indicates the time interval(s) during which the AF request is to be applied			
WebsockNotifConfig	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	Р	Cardinality	Description	Applicability (NOTE 1)
afServiceId	string	0	01	Identifies a service on behalf of which the AF is issuing the request.	, ,
afAppId	string	0	01	Identifies an application. (NOTE 3)	
afTransId	string	0	01	Identifies an NEF Northbound interface transaction, generated by the AF.	
appReloInd	boolean	0	01	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	0	01	Identifies a DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only.	
snssai	Snssai	0	01	Identifies an S-NSSAI.	
externalGroupId	ExternalGroupId	0	01	Identifies a group of users. (NOTE 2)	
anyUeInd	boolean	0	01	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(SubscribedE vent)	0	1N	Identifies the requirement to be notified of the event(s).	
gpsi	Gpsi	0	01	Identifies a user.	
ipv4Addr	lpv4Addr	0	01	(NOTE 2) Identifies the IPv4 address.	
ipv6Addr	lpv6Addr	0	01	(NOTE 2) Identifies the IPv6 address.	
macAddr	MacAddr48	0	01	(NOTE 2) Identifies the MAC address.	
MacAddi	MacAuui46				
dnaiChgType	DnaiChangeType	0	01	Identifies a type of notification regarding UP path management event.	
notificationDestinatio n	Link	С	01	Contains the Callback URL to receive the notification from the NEF. It shall be present if the "subscribedEvents" is present.	
requestTestNotificati on	boolean	0	01	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_te st_event
websockNotifConfig	WebsockNotifConfi g	0	01	Configuration parameters to set up notification delivery over Websocket protocol.	Notification_w ebsocket

self	Link	С	01	Link to the created resource.	
Son		O	01	This parameter shall be supplied by the NEF in HTTP responses that include an object of TrafficInfluSub type	
trafficFilters	array(FlowInfo)	0	1N	Identifies IP packet filters. (NOTE 3)	
ethTrafficFilters	array(EthFlowDesc ription)	0	1N	Identifies Ethernet packet filters. (NOTE 3)	
trafficRoutes	array(RouteToLoca tion)	0	1N	Identifies the N6 traffic routing requirement.	
tfcCorrInd	boolean	0	01	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. Set to "true" if it should be correlated; otherwise set to "false". Default value is "false" if omitted.	
tempValidities	array(TemporalVali dity)	0	0N	Indicates the time interval(s) during which the AF request is to be applied.	
validGeoZoneIds	array(string)	0	1N	Identifies a geographic zone that the AF request applies only to the traffic of UE(s) located in this specific zone.	
afAckInd	boolean	0	01	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	0	01	Indicates whether UE IP address should be preserved. This attribute shall set to "true" if preserved, otherwise, set to "false". Defalult value is "false" if omitted.	URLLC
suppFeat	SupportedFeatures	С	01	Indicates the list of Supported features used as described in subclause 5.4.4. 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. "gpsi", "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	Р	Cardinality	Description	Applicability
appReloInd	boolean	0	01	Identifies whether an application can be relocated once a location of the application has been selected. (NOTE)	
trafficFilters	array(FlowInfo)	0	1N	Identifies IP packet filters.	
ethTrafficFilters	array(EthFlowDe scription)	0	1N	Identifies Ethernet packet filters.	
trafficRoutes	array(RouteToLo cation)	0	1N	Identifies the N6 traffic routing requirement. (NOTE)	
tfcCorrInd	boolean	0	01	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(TemporalV alidity)	0	1N	Indicates the time interval(s) during which the AF request is to be applied. (NOTE)	
validGeoZoneIds	array(string)	0	1N	Identifies a geographic zone that the AF request applies only to the traffic of UE(s) located in this specific zone. (NOTE)	
afAckInd	boolean	0	01	Identifies whether the AF acknowledgement of UP path event notification is expected.	URLLC
addrPreserInd	boolean	0	01	Indicates whether UE IP address should be preserved. (NOTE)	URLLC
NOTE: The value	of the property shall I	be se	t to NULL for r	removal.	

5.4.3.3.4 Type: EventNotification

Table 5.4.3.3.4-1: Definition of type EventNotification

Attribute name	Data type	Р	Cardinality	Description	Applicability (NOTE 1)
afTransId	string	0	01	Identifies an NEF Northbound interface transaction, generated by the AF.	
dnaiChgType	DnaiChangeType	М	1	Identifies the type of notification regarding UP path management event.	
sourceTrafficRoute	RouteToLocation	0	01	Identifies the N6 traffic routing information associated to the source DNAI. May be present if the "subscribedEvent" sets to "UP_PATH_CHANGE". (NOTE 3)	
subscribedEvent	SubscribedEvent	М	1	Identifies a UP path management event the AF requested to be notified of.	
targetTrafficRoute	RouteToLocation	0	01	Identifies the N6 traffic routing information associated to the target DNAI. May be present if the "subscribedEvent" sets to "UP_PATH_CHANGE". (NOTE 3)	
sourceDnai	Dnai	0	01	Source DN Access Identifier. Shall be included for event "UP_PATH_CHANGE" if the DNAI changed (NOTE 2, NOTE 3).	
targetDnai	Dnai	0	01	Target DN Access Identifier. Shall be included for event "UP_PATH_CHANGE" if the DNAI changed (NOTE 2, NOTE 3).	
gpsi	Gpsi	0	01	Identifies a user.	
srcUelpv4Addr	lpv4Addr	0	01	The IPv4 Address of the served UE for the source DNAI.	
srcUelpv6Prefix	Ipv6Prefix	0	01	The Ipv6 Address Prefix of the served UE for the source DNAI.	
tgtUelpv4Addr	lpv4Addr	0	01	The IPv4 Address of the served UE for the target DNAI.	
tgtUelpv6Prefix	Ipv6Prefix	0	01	The Ipv6 Address Prefix of the served UE for the target DNAI.	
ueMac	MacAddr48	0	01	UE MAC address of the served UE.	
afAckUri	Link	0	01	The URI provided by the NEF for the AF acknowledgement. May only be included for event "UP_PATH_CHANGE".	URLLC

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: If the DNAI is not changed while the N6 traffic routing information is changed, the "sourceDnai" attribute and "targetDnai" attribute shall not be provided.

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.

5.4.3.3.5 Type: AfResultInfo

Table 5.4.3.3.5-1: Definition of type AfResultInfo

Attribute name	Data type	Р	Cardinality	Description
afStatus	AfResultStatus	M	1	Identifies the result of the application relocation.
trafficRoute	RouteToLocation	0		Identifies the N6 traffic routing information associated to the target DNAI. 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	Р	Cardinality	Description	Applicability
afTransId	string	С		Identifies an NEF Northbound interface transaction, generated by the AF. It shall be provided if the AF has previously provided it.	
ackResult	AfResultInfo	М	1	Identifies the result of application layer handling.	
gpsi	Gpsi	0	01	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	Custom operation URI	Mapped HTTP method	Description
Event Notification	{notificationUri}	POST	Request for the NIDD Configuration Trigger

5.5.2.2 Event Notification

URI: {notificationUri}

The operation shall support the URI variables defined in table 5.5.2.2-1.

Table 5.5.2.2-1: URI variables

Name	Data type	Definition
notificationUri		A URI indicating the notification destination where N33 notification requests
		shall be delivered to.
		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	Р	Cardinality	Description
NiddConfigTrigge	М	1	The NIDD Configuration Trigger is provided by the NEF to the AF.
r			

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

Data type	Р	Cardinality	Response	Description
			codes	
NiddConfigTriggerReply	М	1	200 OK	The trigger is received successfully.
NOTE: The mandatory	/ H	TP error status cod	les for the PO	OST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4]
also apply.				

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		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: NiddConfigTrigger

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 NiddConfigTrigger

	ring	М	1	Identifies the trigger receiving entity.	
nefld str	ring			Gillity.	
	9	М	1	Identifies the trigger sending entity.	
gpsi Gr	psi	М	1	Identifies a user.	
suppFeat Su	upportedFeatures	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: NiddConfigTriggerReply

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 NiddConfigTriggerReply

Attribu	ute name	Data type	Р	Cardinality	Description	Applicability (NOTE)
suppFeat		SupportedFeatures	M		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	Feature Name	Description
number		

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.

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

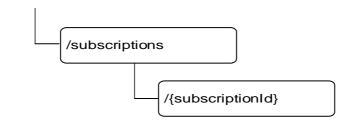


Figure 5.6.1.1-1: Resource URI structure of the AnalyticsExposure API

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	{apiRoot}/3gpp-	GET	Read all subscriptions for a given AF
Subscriptions	analyticsexposure/v1/{afld}/subscr iptions	POST	Create a new subscription to analytics exposure
		GET	Read the subscription to the analytics exposure
Individual Analytics Exposure Subscription	{apiRoot}/3gpp- analyticsexposure/v1/{afld}/subscr iptions /{subscriptionId}	PUT	Modify all of the properties of an existing subscription to an analytics exposure
		DELETE	Delete the subscription to the 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 subscribtions 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	Р	Cardinality	Description
supp-feat	SupportedFeat ures	0	01	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	Р	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	Р	Cardinality	Response codes	Description		
array(AnalyticsEx posureSubsc)	М	0N	200 OK	The subscription information for the AF in the request URI are returned.		

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	Р	Cardinality	Description
AnalyticsExposur	М	1	Parameters to request a subscription to retrieve analytics information with the
eSubsc			NEF.

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

Data type	Р	Cardinality	Response codes	Description	
AnalyticsExposur eSubsc	M	1	201 Created	The subscription was created successfully. 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	Р	Cardinality	Description
Location	string	M		Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-analyticsexposure/v1/{afld}/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].
afld	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 the NEF 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	Р	Cardinality	Description
supp-feat	SupportedFeat ures	0	01	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	Р	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	Р	Cardinality	Response codes	Description
AnalyticsExposur eSubsc	M	1		The subscription information for the AF in the request URI are returned.
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.				

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	Р	Cardinality	Description
AnalyticsExposur	М	1	Modify an existing subscription to retrieve analytics information with the NEF.
eSubsc			

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

Data type	Р	Cardinality	Response codes	Description		
AnalyticsExposur eSubsc	М	1	200 OK	The subscription was updated successfully.		
N/A			204 No Content	The subscription was updated successfully.		
	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.					

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	Р	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	Р	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	Р	Cardinality	Response codes	Description
N/A				204 No Content	The subscription was terminated successfully.
NOTE:	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.				

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-	POST	Request to fetch analytics
	analyticsexposure/v1/{afld}/fetch		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	Р	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	М	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".			
NOTE: The manadatory HTTP error status code for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.							

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	Custom operation URI	Mapped HTTP method	Description
Event Notification	{notifUri}		The analytics event notification is provided by the NEF to the AF.

5.6.2.2 Event Notification

URI: {notifUri}

The operation shall support the URI variables defined in table 5.6.2.2-1.

Table 5.6.2.2-1: 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	Р	Cardinality	Description
AnalyticsEventNo	M	1	The analytics event notification is provided by the NEF to the AF.
tification			

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

Data	type	Р	Cardinality	Response codes	Description
N/A				204 No Content	The event notification is received successfully.
NOTE:	The mand also apply		ry HTTP error status	codes for the I	POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4]

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 AnalytcisExposure API.

5.6.3.2 Reused data types

The data types reused by the AnalytcisExposure 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]	
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user
		group.
ExceptionId	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	Р	Cardinality	Description	Applicability (NOTE)
analyEventsSubs	array(AnalyticsEventS ubsc)	М	1N	Subscribed analytics events.	
analyRepInfo	ReportingInformation	0	01	Reporting requirement information of the subscription.	
notifUri	Uri	М	1	Notification URI for analytics event reporting.	
notifld	string	M	1	Notification Correlation ID assigned by the NF service consumer.	
eventNotifis	array(AnalyticsEventN otif)	С	1N	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.	
suppFeat	SupportedFeatures	С	01	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.	

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	Р	Cardinality	Description	Applicability
notifld	string	М	1	Notification Correlation ID assigned by	
				the NF service consumer.	
analyEventNotifs	array(AnalyticsEv entNotif)	M	1N	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	Р	Cardinality	Description	Applicability
analyEvent	AnalyticsEvent	М	1	Detected analytics event.	
timeStamp	DateTime	М	1	Time at which the event is observed.	
ueMobilityInfos	array(UeMobility Exposure)	С	1N	Contains the UE mobility information. Shall be present if the "analyEvent" attribute sets to "UE_MOBILITY"	Ue_Mobility
ueCommInfos	array(UeCommu nication)	С	1N	Contains the application communication information. Shall be present if the "analyEvent" attribute sets to "UE_COMM"	Ue_Communication
abnormalInfos	array(AbnormalE xposure)	С	1N	Contains the user's abnormal behavior information. Shall be present if the "analyEvent" attribute sets to "ABNORMAL_BEHAVIOR"	Abnormal_Behavior
congestInfos	array(CongestInf o)	С	1N	Contains the UE's user data congestion information. Shall be present if the "analyEvent" attribute sets to "CONGESTION"	Congestion
nwPerfInfos	array(NetworkPer fExposure)	С	1N	The network performance information. Shall be present when the requested event is "NETWORK_PERFORMANCE".	Network_Performanc e
qosSustainInfos	array(QosSustain abilityExposure)	С	1N	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	Р	Cardinality	Description	Applicability		
analyEvent	AnalyticsEvent	Μ	1	Requested analytics event.			
analyEventFilter	AnalyticsEventFilt erSubsc	0	01	Represents analytics event filter.	(NOTE)		
tgtUe	TargetUeld	0	01	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	Р	Cardinality	Description	Applicability
locArea	LocationArea5G	Ο	01	Network area of interest (NOTE 1)	Abnormal_Behavior Congestion Ue_Communication Ue_Mobility QoS_Sustainability Network_Performanc e
applds	array(ApplicationI d)	0	1N	Each element identifies an application.	Abnormal_Behavior Ue_Communication
excepRequs	array(Exception)	0	1N	Represents a list of Exception Ids with associated thresholds. (NOTE 2, NOTE 3)	Abnormal_Behavior
exptAnaType	ExpectedAnalytic sType	0	01	Represents expected UE analytics type. (NOTE 3)	Abnormal_Behavior
exptUeBehav	ExpectedUeBeha viourData	0	01	Represents expected UE behaviour.	Abnormal_Behavior
reptThlds	array(ThresholdL evel)	0	1N	Represents the congestion levels to be reached in order to be notified by the NEF. (NOTE 4)	Congestion
nwPerfReqs	array(NetworkPer fRequirement)	С	1N	Represents the network performance requirements. This attribute shall be included when eventId is "NETWORK_PERFORMANCE".	Network_Performanc e
snssai	Snssai	0	01	Identifies the network slice information	Ue_Communication QoS_Sustainability
qosReq	QosRequirement	С	01	Represents the QoS requirements. This attribute shall be included when eventId is "QOS_SUSTAINABILITY".	QoS_Sustainability
qosFlowRetThds	array(Retainabilit yThreshold)	С	1N	Represents the QoS flow retainability thresholds, Shall be supplied for the 5Ql of GBR resource type. (NOTE 5)	QoS_Sustainability
ranUeThrouThds	array(BitRate)	С	1N	Represents the RAN UE throughput thresholds. Shall be supplied for the 5QI of non-GBR resource type. (NOTE 5)	QoS_Sustainability
extraReportReq	EventReportingR equirement	0	01	The extra event reporting requirement information.	

NOTE 1: The "locArea" attribute shall be provided if the "tgtUe" attribute sets to "anyUeInd".

NOTE 2: Only "exceptd" and "exceptevel" within the Exception data type apply to the "excepRequs" attribute.

NOTE 3: Either "excepRequs" or "exptAnaType" shall be provided if the subscribed event is "ABNORMAL BEHAVIOUR".

NOTE 4: If the subscribed event is "CONGESTION", this attribute shall be provided if "notifMethod" within

[&]quot;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.

5.6.3.3.7 Type TargetUeld

Table 5.6.3.3.7-1: Definition of type TargetUeld

Attribute name	Data type	Р	Cardinality	Description	Applicability
anyUeInd	boolean	0	01	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 Congestion Network_Performanc e QoS_Sustainability
gpsi	Gpsi	0	01	Identifies a GPSI for an UE.	Abnormal_Behavior Congestion Ue_Mobility Ue_Communication Network_Performanc e
exterGroupId	ExternalGroupId	0	01	Represents an external group identifier and identifies a group of UEs.	Abnormal_Behavior Ue_Mobility Ue_Communication Network_Performanc e
NOTE: For an app	licable feature, only	one	attribute identi	fying the target UE shall be provided	d.

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	Р	Cardinality	Description	Applicability
ts	DateTime	0	01	This attribute identifies the timestamp when the UE arrives	
				the location. (NOTE 1)	
recurringTime	ScheduledComm	0	01	Identifies time of the day and day	
	unicationTime			of the week which are valid within	
				the observation period when the	
		L		UE moves. (NOTE 1, NOTE 2)	
duration	DurationSec	М	1	This attribute identifies the time	
				duration the UE stays in the	
				If the analytics result applies for a	
				group of UEs, it indicates the	
				average duration for the group of	
				UEs.	
durationVariance	Float	С	01	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(UeLocation	М	1N	This attribute includes a list of UE	
	Info)			location information during the	
matia	Committee and out to	С	01	time duration.	
ratio	SamplingRatio	C	01	This attribute contains the percentage of UEs with same	
				analytics result in the group.	
				Shall be present if the analytics	
				result applies for a group of UEs.	
confidence	Uinteger	С	01	Indicates the confidence of the	
				prediction. (NOTE 3)	
				Shall be present if the analytics	
				result is a prediction.	
NOTE 1: Fither ts of	or recurringTime sha	ll he i	orovided		

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.

NOTE 3: 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.

5.6.3.3.10 Type UeLocationInfo

Table 5.6.3.3.10-1: Definition of type UeLocationInfo

Attribute name	Data type	Р	Cardinality	Description	Applicability
loc	LocationArea5G	М	1	This attribute contains the detailed location.	
ratio	SamplingRatio	С	01	If the analytics result applies for a group of UEs, this attribute contains the percentage of UEs in the group. The sum of all ratios on a given time slot is equal or less than 100%.	
confidence	Uinteger	С	01	If the analytics result is a prediction, it indicates the confidence of the prediction.	

5.6.3.3.11 Void

Type: AnalyticsRequest 5.6.3.3.12

Table 5.6.3.3.12-1: Definition of type AnalyticsRequest

Attribute name	Data type	Р	Cardinality	Description	Applicability
analyEvent	AnalyticsEvent	М	1	Identifies the analytics type.	
analyEventFilter	AnalyticsEventFilt er	С	01	Shall be included to identify the analytics when filter information is needed for the related event.	
analyRep	EventReportingR equirement	0	01	Identifies the analytics reporting requirement information.	
tgtUe	TargetUeId	0	01	Identifies the target UE information.	
suppFeat	SupportedFeatur es	М	1	Represents the features supported by the NF service consumer.	

Type AnalyticsEventFilter 5.6.3.3.13

Table 5.6.3.3.13-1: Definition of type AnalyticsEventFilter

Attribute name	Data type	Р	Cardinality	Description	Applicability
locArea	LocationArea5G	С	01	This IE represents the network area where the NF service consumer wants to know the analytics result. Shall be present if the "analyEvent" attribute sets to "QOS_SUSTAINABILITY".	Ue_Mobility Ue_Communication Network_Performance QoS_Sustainability
dnn	Dnn	0	01	Identifies the DNN.	Ue_Communication
nwPerfTypes	array(NetworkPerfType)	С	1N	Represents the network performance requirements. This attribute shall be included when eventId is "NETWORK_PERFORMANCE".	Network_Performance
applds	array(ApplicationId)	0	1N	Each element identifies an application. The absence of applds means all applications.	Ue_Communication Abnormal_Behavior
exceplds	array(ExceptionId)	0	1N	Represents a list of Exception Ids. (NOTE)	Abnormal_Behavior
exptAnaType	ExpectedAnalyticsType	0	01	Represents expected UE analytics type. (NOTE)	Abnormal_Behavior
exptUeBehav	ExpectedUeBehaviourData	0	01	Represents expected UE behaviour.	Abnormal_Behavior
snssai	Snssai	0	01	Identifies the network slice information	Ue_Communication QoS_Sustainability
qosReq	QosRequirement	С	01	Represents the QoS requirements. This attribute shall be included when analyEvent is "QOS_SUSTAINABILITY".	QoS_Sustainability

5.6.3.3.14 Type AnalyticsData

Table 5.6.3.3.14-1: Definition of type AnalyticsData

Attribute name	Data type	Р	Cardinality	Description	Applicability
ueMobilityInfos	array(UeMobilityExpos ure)	С	1N	Contains the UE mobility information. Shall be present if the "analyEvent" attribute sets to "UE_MOBILITY"	Ue_Mobility
ueCommInfos	array(UeCommunicatio n)	С	1N	Contains the application communication information. Shall be present if the "analyEvent" attribute sets to "UE_COMM"	Ue_Communication
nwPerfInfos	array(NetworkPerfExpo sure)	С	1N	The network performance information. Shall be present when the requested event is "NETWORK_PERFORMANCE" .	Network_Performance
abnormalInfos	array(AbnormalExposu re)	С	1N	Contains the user's abnormal behavior information. Shall be present if the "analyEvent" attribute sets to "ABNORMAL BEHAVIOR"	Abnormal_Behavior
congestInfos	array(CongestInfo)	С	1N	Contains the UE's user data congestion information. Shall be present if the "analyEvent" attribute sets to "CONGESTION"	Congestion
qosSustainInfos	array(QosSustainability Exposure)	С	1N	Contains the QoS sustainability information. Shall be present if the "analyEvent" attribute is set to "QOS_SUSTAINABILITY"	QoS_Sustainability
suppFeat	SupportedFeatures	M	1	Represents the features supported by the NF service consumer.	

5.6.3.3.15 Type AbnormalExposure

Table 5.6.3.3.15-1: Definition of type AbnormalExposure

Attribute name	Data type	Р	Cardinality	Description	Applicability
	array(Gpsi)	С	1N	Each element identifies a UE which is	
gpsis				affected with the Exception.	
960.0				Shall be present if the subscription	
				request applies to more than one UE.	
excep	Exception	М	1	Contains the exception information.	
ratio	SamplingRatio	С	01	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	С	01	Indicates the confidence of the	
				prediction. (NOTE)	
				Shall be present if the analytics result	
				is a prediction.	
addtMeasInfo	AdditionalMeasureme	0	01	Additional measurement.	
	nt				
	requested period identifie	,		nd "endTs" attributes in the "EventReporti	ngRequirement"

5.6.3.3.16 Type CongestInfo

Table 5.6.3.3.16-1: Definition of type CongestInfo

Attribute name	Data type	Р	Cardinality	Description	Applicability
locArea	LocationArea5G	М	1	Network area of interest	
	array(CongestionAnaly	М	1N	Represents data congestion	
cngAnas	tics)			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	Р	Cardinality	Description	Applicability
cngType	CongestionType	М	1	Represents congestion type.	
tmWdw	TimeWindow	М	1	Represents a start time and a stop time observed for the congestion information.	
nsi	ThresholdLevel	М	1	Represents network congestion level.	
confidence	Uinteger	С	01	Indicates the confidence of the prediction. (NOTE) Shall be present if the analytics result is a prediction.	
		-		nd "endTs" attributes in the "EventRep	ortingRequirement"

5.6.3.3.18 Type QosSustainabilityExposure

Table 5.6.3.3.18-1: Definition of type QosSustainabilityExposure

Attribute name	Data type	Р	Cardinality	Description	Applicability
locArea	LocationArea5G	M	1	Identification(s) of applicable location areas where the analytics result applies.	
startTs	DateTime	М	1	Represents the start time of the applicable observing period.	
endTs	DateTime	М	1	Represents the end time of the applicable observing period.	
qosFlowRetThd	RetainabilityThre shold	0	01	The reporting QoS Flow Retainability Threshold that are met or crossed for 5QI of GBR resource type. (NOTE 1)	
ranUeThrouThd	BitRate	0	01	The reporting RAN UE Throughput Threshold that are met or crossed for 5QI of non-GBR resource type. (NOTE 1)	
confidence	Uinteger	С	01	Indicates the confidence of the prediction. (NOTE 2) Shall be present if the analytics result is a prediction.	

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.

5.6.3.3.19 Type NetworkPerfExposure

Table 5.6.3.3.19-1: Definition of type NetworkPerfExposure

Attribute name	Data type	Р	Cardinality	Description	Applicability
locArea	LocationArea5G	М	1	Identification of network area to which the subscription applies.	
nwPerfType	NetworkPerfType	M	1	The type of the network performance	
relativeRatio	SamplingRatio	0	01	The reported relative ratio expressed in percentage. (NOTE 1)	
absoluteNum	Uinteger	0	01	The reported absolute number (NOTE 1)	
confidence	Uinteger	С	01	Indicates the confidence of the prediction. (NOTE 2) Shall be present if the analytics result is a prediction.	

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.

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_BEH AVIOR	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_PER FORMANCE	The AF requests to be notified about analytics information of network performance information.	Network_Performance
QOS_SUSTAINA BILITY	The AF requests to be notified about analytics information of QoS sustainability.	QoS_Sustainability

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].

sustainability.

Feature Feature Name Description number 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. QoS Sustainability This feature indicates support for the analytics event related to QoS 6

Table 5.6.4-1: Features used by AnalyticsExposure API

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.

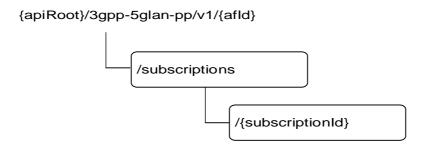


Figure 5.7.1.1-1: Resource URI structure of the 5GLANParameterProvision API

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	{apiRoot}/3gpp-5glan-	GET	Read all subscriptions for a given AF
Subscriptions	pp/v1/{afld}/subscriptions	POST	Create a new subscription to provision parameters
		GET	Read an existing subscription identified by {subscriptionId}
Individual 5GLAN Parameters	{apiRoot}/3gpp-5glan- pp/v1/{afld}/subscriptions/{subscri	PUT	Modify all of the properties of an existing subscription identified by {subscriptionId}
Provision Subscription	ptionId}	PATCH	Modify some properties of an existing subscription identified by {subscriptionId}
		DELETE	Delete the 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 subscribtions for the given AF, or create an new individual 5GLAN parameters provision subscription to provision parameters to the NEF.

5.7.1.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-5glan-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].	
afld	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	Р	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	Р	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	Р	Cardinality	Response	Description			
			codes				
array(5GLanPara		0N	200 OK	All the subscription information for the AF in the request URI are			
metersProvision)				returned.			
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 appl	also apply.						

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	Р	Cardinality	Description
5GLanParameter	М	1	Parameters to create a subscription to provision parameters.
sProvision			

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		
5GLanParameter sProvision	M	1	201 Created	The subscription was created successfully. 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	Р	Cardinality	Description
Location	string	М		Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-5glan-pp/v1/{afld}/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	Р	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	Ք	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	Р	Cardinality	Response codes	Description		
5GLanParameter sProvision	М	1		The information for the subscription in the request URI are returned.		
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.						

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	Р	Cardinality	Description
5GLanParameter	M	1	Modify an existing subscription to provision parameters.
sProvision			

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

Data type	Р	Cardinality	Response codes	Description		
5GLanParameter sProvision	М	1	200 OK	The subscription was updated successfully.		
n/a			204 No Content	The subscription was updated successfully.		
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.						

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	Р	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	Р	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	Р	Cardinality	Response codes	Description
N/A				204 No Content	The subscription was terminated successfully.
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.					

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	Р	Cardinality	Description
5GLanParameter	M	1	Modify an existing subscription to provision parameters.
sProvisionPatch			

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

Data type	Р	Cardinality	Response codes	Description		
5GLanParameter sProvision	М	1	200 OK	The subscription was updated successfully.		
n/a			204 No Content	The subscription was updated successfully.		
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.						

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.				
lpv4Addr	3GPP TS 29.571 [8]	Identifies an IPv4 address.				
lpv6Addr	3GPP TS 29.571 [8]	Identifies an IPv6 address.				
Link	3GPP TS 29.122 [4]	Identifies a referenced resource.				
Osld	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	Р	Cardinality	Description	Applicability
self	Link	С	01	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	М	1	Represents the 5G LAN	
				service related parameters.	
suppFeat	SupportedFeatures	М	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	Р	Cardinality	Description	Applicability
exterGroupId	ExternalGroupId	М	1	Identifies an 5G Virtual	
				Network Group	
gpsis	map(Gpsi)	М	1N	Represents the list of 5G VN	
				Group members, each member	
				is identified by GPSI	
dnn	Dnn	М	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	lpv4Addr	0	1	Identifies the DN-AAA server	
				IPv4 address provided by AF,	
				for the secondary	
				authentication/authorization	
				and/or UE IP address	
	1 04 11		14	allocation by DN-AAA server.	
aaalpv6Addr	lpv6Addr	0	1	Identifies the DN-AAA server	
				IPv6 address provided by AF,	
				for the secondary	
				authentication/authorization	
				and/or UE IP address	
	(A 11		4.0	allocation by DN-AAA server.	
aaaUsgs	array(AaaUsage)	0	12	Identifies the usage needs for	
				secondary authentication/authorization	
				and/or UE IP address	
				allocation from the DN-AAA	
				server.	
snssai	Snssai	М	1	S-NSSAI for the 5G VN group	
sessionType	PduSessionType	M	1	PDU Session Type allowed for	
2223,0,11,70		1		5G VN group.	
appDesps	map(AppDescriptor)	М	1N	Describes the operation	
				systems and the corresponding	
				applications for each operation	
				systems. The key of map is	
				osld.	

5.7.2.3.4 Type: AppDescriptor

Table 5.7.2.3.4-1: Definition of type AppDescriptor

Attribute name	Data type	Р	Cardinality	Description	Applicability
osld	Osld	M	1	Identifies an operating system	
				supported by the UE	
appld	map(ApplicationId)	M	1N	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	Р	Cardinality	Description	Applicability
5gLanParamsPatch	5GLanParameters	0	01	Represents the 5G LAN	
	Patch			servise related parameters.	

5.7.2.3.6 Type: 5GLanParametersPatch

Table 5.7.2.3.6-1: Definition of type 5GLanParametersPatch

Attribute name	Data type	Р	Cardinality	Description	Applicability
gpsis	map(GpsiRm)	0	1N	Represents the list of 5G VN Group members, each member is identified by GPSI	
appDesps	map(AppDescriptorRm)	O	1N	Describes the operation systems and the corresponding applications for each operation system. 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)	0	1N	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.

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

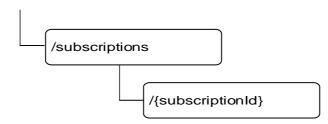


Figure 5.8.1.1-1: Resource URI structure of the ApplyingBdtPolicy API

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

Table 5.8.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
Applied BDT Policy	{apiRoot}/3gpp-applying-bdt-policy/v1/{afld}/subscriptions	GET	Read all applied BDT policy subscriptions for a given AF.
Subscription	policy/v1/{airu}/subscriptions	POST	Create a new applied policy subscription.
		GET	Read the applied BDT policy subscription.
Individual Applied BDT Policy Subscription	{apiRoot}/3gpp-applying-bdt-policy /v1/{afld}/subscriptions/{subscriptionId}	PATCH	Modify BDT Reference ID of an existing subscription to a BDT policy.
		DELETE	Delete the applied BDT policy subscription

5.8.1.2 Resource: Applied BDT Policy Subscription

5.8.1.2.1 Introduction

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

5.8.1.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-applying-bdt-policy/v1/{afId}/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 subscription 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	Р	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	Р	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	Р	Cardinality	Response	Description
			codes	
array(AppliedBdt Policy)		0N	200 OK	The applied BDT Policy subscriptions for the AF in the request URI are returned.
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.				

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	Р	Cardinality	Description
AppliedBdtPolicy	М	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. 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	Р	Cardinality	Description
Location	string	М		Contains the URI of the newly created resource, according to
				the structure: {apiRoot}/3gpp-applying-bdt-
				policy/v1/{afld}/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].
afld	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	Р	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	Ք	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	Р	Cardinality	Response codes	Description	
AppliedBdtPolicy	М	1	200 OK	The subscription information for the AF in the request URI are returned.	
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.					

5.8.1.3.3.3 PATCH

The PATCH method allows to change some properties of an existing applying 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	Р	Cardinality	Description
AppliedBdtPolicyPatch	М	1	Partial update of a subscription to applying BDT policy subscritpion.

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	М	1	200 OK	The subscription was modified successfully.	
n/a			204 No Content	The subscription was modified successfully.	
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.					

5.8.1.3.3.4 DELETE

The DELETE method deletes the applying 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	Р	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	Р	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.	
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.					

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
BdtReferenceId	3GPP TS 29.122 [4]	Identifier of a selected BDT policy.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user group.
SupportedFeatures		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	Р	Cardinality	Description	Applicability (NOTE)
bdtRefId	BdtReferenceId	М	1	Identifies a selected policy of background data transfer.	
gpsi	Gpsi	С	01	Identifies a user.	
externalGroupId	ExternalGroupId	С	01	Identifies a user group.	
suppFeat	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	
NOTE: Only one of	the properties "gpsi" of	r "exterr	nalGroupId" sh	all 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	Ρ	Cardinality	Description	Applicability
bdtRefld	BdtReferenceId	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.

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

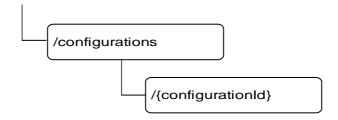


Figure 5.9.1.1-1: Resource URI structure of the IPTVConfiguration API

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	{apiRoot}/3gpp- iptvconfiguration/v1/{afld}/configur	GET	Read all configurations for a given AF
IF I V Configurations	ations	POST	Create a new IPTV configuration
		GET	Read an existing configuration identified by {configurationId}
Individual IPTV Configuration	{apiRoot}/3gpp-	PUT	Modify all of the properties of an existing configuration identified by {configurationId}
individual if I v Configuration	iptvconfiguration/v1/{afld}/configur ations/{configurationId}	PATCH	Modify some of the properties of an existing configuration identified by {configurationId}
		DELETE	Delete the 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].
afld	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	Р	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	Р	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	Р	Cardinality	Response	Description	
			codes		
array(IptvConfigD ata)	М	0N		All the configuration information for the AF in the request URI are returned.	
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.					

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	Р	Cardinality	Description
IptvConfigData	М	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	Р	Cardinality	Response codes	Description		
IptvConfigData	М	1	201 Created	The configuration resource was created successfully. 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	Р	Cardinality	Description
Location	string	М		Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-iptvconfiguration/v1/{afld}/configurations/{configurationld}

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].
afld	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 the NEF 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	Р	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	Р	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	Р	Cardinality	Response codes	Description	
IptvConfigData	М	1	200 OK	The information for the configuration in the request URI are returned.	
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.					

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	Р	Cardinality	Description
IptvConfigData	М	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	Р	Cardinality	Response codes	Description		
IptvConfigData	М	1	200 OK	The configuration resource was updated successfully.		
n/a			204 No Content	The configuration resource was updated successfully.		
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.						

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	Р	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	Р	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	Ь	Cardinality	Response	Description	
				codes		
N/A				204 No	The configuration resource was terminated successfully.	
				Content		
NOTE:	E: 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.					

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	Р	Cardinality	Description
IptvConfigDataPat	М	1	Partial update an existing configuration.
ch			

Table 5.9.1.3.3.5-2: Data structures supported by the PATCH Response Body on this resource

Data type	Р	Cardinality	Response codes	Description			
IptvConfigData	М	1	200 OK	The configuration resource was updated successfully.			
n/a			204 No Content	The configuration resource was updated successfully.			

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.
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user group.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
lpv4Addr	3GPP TS 29.571 [8]	Identifies an IPv4 address.
lpv6Addr	3GPP TS 29.571 [8]	Identifies an IPv6 address.
Link	3GPP TS 29.122 [4]	
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	Р	Cardinality	Description	Applicability
self	Link	С	01	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	С	01	Identifies GPSI.(NOTE)	
exterGroupId	ExternalGroupId	С	01	Represents a group of users. (NOTE)	
afAppId	string	М	1	Identifies an application.	
dnn	Dnn	0	01	Identifies a DNN, a full DNN	
				with both the Network Identifier	
				and Operator Identifier, or a	
				DNN with the Network Identifier	
				only.	
snssai	Snssai	0	01	Identifies an S-NSSAI.	
multiAccCtrls	map(MulticastAc	M	1N	Identifies a list of multicast	
	cessControl)			address access control	
				information.	
suppFeat	SupportedFeatur	M	1	Indicates the negotiated	
	es			supported features.	
NOTE: Only one of th	e "gpsi" or "exterGro	oupld" at	tribute 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	Р	Cardinality	Description	Applicability
srclpv4Addr	lpv4Addr	0	01	Identifies the source IPv4 address of IPTV multicast channel.	
srclpv6Addr	lpv6Addr	0	01	Identifies the source IPv6 address of IPTV multicast channel.	
multicastV4Addr	lpv4Addr	0	01	Identifies the multicast IPv4 address of IPTV multicast channel. (NOTE)	
multicastV6Addr	lpv6Addr	0	01	Identifies the multicast IPv6 address of IPTV multicast channel. (NOTE)	
accStatus	AccessRightStatus	М	1	Represents access right status of the multicast channel.	
NOTE: At least of	one of the "multicastV4Addr	" or "m	nulticastV6Add	r" 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	Р	Cardinality	Description	Applicability
multiAccCtrls	map(MulticastAc	0	1N	Identifies a list of multicast	
	cessControl)			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.

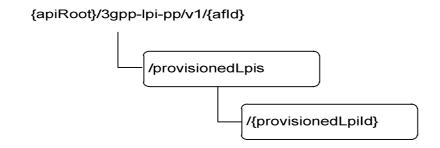


Figure 5.10.1.1-1: Resource URI structure of the LpiParameterProvision API

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 URI HTTP method

Resource name Description Read all LPI Parameters Provisioningresources for a **GET** {apiRoot}/3gpp-lpigiven AF LPI Parameters Provisionings pp/v1/{afld}/provisionedLpis Create a new Individual LPI POST Parameters Provisioning resource Read an existing Individual LPI Parameters Provisioning GET resource identified by {provisionedLpild} Modify all of the properties of {apiRoot}/3gpp-lpian existing Individual LPI Individual LPI Parameters pp/v1/{afld}/provisionedLpis/{provi PUT Parameters Provisioning Provisioning sionedLpild} resource identified by {provisionedLpild} Delete the existing Individual LPI Parameters Provisioning **DELETE** 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/{afId}/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 provisioned LPIs 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	Р	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	Р	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	Р	Cardinality	Response codes	Description	
array(LpiParam etersProvision)	М	0N		All the LPI Parameters Provisioning information for the AF in the request URI are returned.	
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.					

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	Ρ	Cardinality	Description
LpiParametersPro	M	1	Parameters to create an LPI Parameters Provisionings resource to provision
vision			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
LpiParametersPro vision	М	1	201 Created	The resource was created successfully.
VISIOII			Created	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	Р	Cardinality	Description
Location	string	M		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 provisioned LPI parameters resource.

5.10.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-lpi-pp/v1/{afId}/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 providedLpis 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	Р	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	Р	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	Р	Cardinality	Response codes	Description
LpiParametersPro vision	М	1	200 OK	The information for the source in the request URI are returned.
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.				

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	Р	Cardinality	Description
LpiParametersPro	М	1	Modify an existing individual LPI Parameters Provisioning resource to
vision			provision parameters.

Table 5.10.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource

Data type	Р	Cardinality	Response codes	Description	
LpiParametersPro vision	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.	
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.					

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	Р	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	Р	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	Р	Cardinality	Response codes	Description	
N/A			204 No Content	The resource was removed successfully.	
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.					

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.
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	Р	Cardinality	Description	Applicability
self	Link	С	01	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	0	01	Identifies a group of UEs.	
				(NOTE)	
gpsi	Gpsi	0	01	Identifies an UE with GPSI.	
				(NOTE)	
lpi	Lpi	M	1	Location Privacy Indication	
				parameters	
suppFeat	SupportedFeatures	M	1	Indicates the negotiated	
				supported features.	
NOTE: Only one of	the "gpsi" or "exterGro	oupld" at	tribute shall be	provided.	

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-serviceparameter/v1/

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-serviceparameter" 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.

{apiRoot}/3gpp-serviceparameter/v1/{afld}

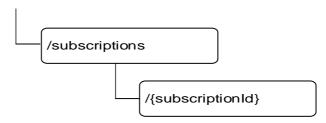


Figure 5.9.1.1-1: Resource URI structure of the ServiceParameter API

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	{apiRoot}/3gpp- serviceparameter/v1/{afld}/subscri	GET	Read all subscriptions for a given AF.
Subscripions	ptions	POST	Create a new service parameter subscription.
Individual Service Parameter Subscripion		GET	Read an existing subscription identified by {subscriptionId}
	{apiRoot}/3gpp- serviceparameter/v1/{afId}/subscri	PUT	Modify all of the properties of an existing subscription. identified by {subscriptionId}
	ptions/{subscriptionId}	PATCH	Modify some of the properties of an existing subscription identified by {subscriptionId}
		DELETE	Delete the 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-serviceparameter/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].
afld	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	Р	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	Р	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	Р	Cardinality	Response	Description	
			codes		
array(ServicePara meterData)	М	0N	200 OK	All the subscription information for the AF in the request URI are returned.	
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.					

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	Ք	Cardinality	Description
ServiceParameter	M	1	Parameters to create a service parameter subscription resource.
Data			

Table 5.11.1.2.3.3-2: Data structures supported by the POST Response Body on this resource

Data type	Р	Cardinality	Response codes	Description	
ServiceParameter Data	M	1	201 Created	The subscription resource was created successfully. The URI of the created resource shall be returned in the "Location" HTTP header.	
n/a			204 No Content	The subscription resource was created successfully. 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	М	1	Contains the URI of the newly created resource, according to
				the structure: {apiRoot}/3gpp-
				serviceparameter/v1/{afld}/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-serviceparameter/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].
afld	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	Р	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	Р	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	Р	Cardinality	Response codes	Description		
ServiceParameter Data	М	1		The information for the subscription in the request URI are returned.		
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.						

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	Р	Cardinality	Description
ServiceParameter	М	1	Modify an existing subscription.
Data			

Table 5.11.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource

Data type	Р	Cardinality	Response codes	Description			
ServiceParameter Data	М	1	200 OK	The subscription resource was updated successfully.			
n/a			204 No Content	The subscription resource was updated successfully.			
	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.						

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	Р	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	Р	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.	
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.					

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 5.9.1.3.3.5-1: Data structures supported by the PATCH Request Body on this resource

Data type	Р	Cardinality	Description
ServiceParameter	М	1	Partial update an existing subscription.
DataPatch			

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		
ServiceParameter DataPatch	М	1	200 OK	The subscription resource was updated successfully.		
n/a			204 No Content	The subscription resource was updated successfully.		
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.						

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.
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 5.11.3-1.

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	Р	Cardinality	Description	Applicability
self	Link	С	01	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	0	01	Identifies a DNN.	
snssai	Snssai	0	01	Identifies an S-NSSAI.	
afServiceId	string	0	01	Identifies a service on behalf of which	
				the AF is issuing the request.	
appld	string	0	01	Identifies an application identifier.	
gpsi	Gpsi	0	01	Identifies GPSI.	
uelpv4	lpv4Addr	0	01	The IPv4 address of the served UE.	
uelpv6	lpv6Addr	0	01	The IPv6 address of the served UE.	
ueMac	MacAddr48	0	01	The MAC address of the served UE.	
exterGroupId	ExternalGroupId	0	01	Represents a group of users.	
anyUeInd	boolean	0	01	Identifies whether the service	
				parameters applies to any UE. This	
				attribute shall set to "true" if applicable	
				for any UE, otherwise, set to "false".	
paramOverPc5	ParameterOverPc5	0	01	Contains the service parameter used	
				over PC5	
paramOverUu	ParameterOverUu	0	01	Contains the service parameter used	
				over Uu	
suppFeat	SupportedFeatures	С	01	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. "exterGroupId" attribute) or any UE indication (i.e. "anyUeInd" attribute) shall be included.

NOTE 2: Either the "afServiceId" attribute, "appId" 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	Р	Cardinality	Description	Applicability
paramOverPc5	ParameterOverP	0	01	Contains the service parameter	
	c5Rm			used over PC5	
paramOverUu	ParameterOverU	0	01	Contains the service parameter	
	uRm			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]	
ParameterOverPc5R m	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 ACSParameterProvision API

5.12.1 Resources

5.12.1.1 Overview

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 ACSParameterProvision API.

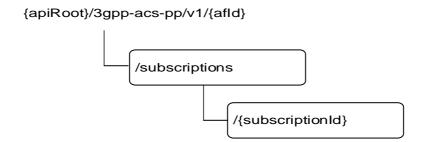


Figure 5.12.1.1-1: Resource URI structure of the ACSParameterProvision API

Table 5.12.1.1-1 provides an overview of the resources and HTTP methods applicable for the ACSParameterProvision API.

Table 5.12.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
ACS Configuration	{apiRoot}/3gpp-acs-	GET	Read all subscriptions for a given AF.
Subscripions	pp/v1/{afld}/subscriptions	POST	Create a new ACS configuration subscription.
		GET	Read an existing subscription identified by {subscriptionId}
Individual ACS Configuration Subscripion	{apiRoot}/3gpp-acs- pp/v1/{afld}/subscriptions/{subscriptionId}	PUT	Modify all of the properties of an existing subscription. identified by {subscriptionId}
		DELETE	Delete the 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-acs-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].
afld	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	Р	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	Р	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	Р	Cardinality	Response	Description	
			codes		
array(AcsConfigur	М	0N	200 OK	All the subscription information for the AF in the request URI are	
ationData)				returned.	
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 appl	у.				

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	М	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	Р	Cardinality	Response codes	Description			
AcsConfiguration Data	M	1	201 Created	The subscription resource was created successfully. 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.						

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-acs-pp/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].						
afld	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	Р	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	Р	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	Р	Cardinality	Response	Description
			codes	
AcsConfiguration Data	М	1	200 OK	The information for the subscription in the request URI are returned.
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.				

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	Р	Cardinality	Description
AcsConfiguration	М	1	Modify an existing subscription.
Data			

Table 5.12.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource

Data type	Р	Cardinality	Response codes	Description	
AcsConfiguration Data	М	1	200 OK	The subscription resource was updated successfully.	
n/a			204 No Content	The subscription resource was updated successfully.	
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.					

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	Р	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	Р	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	Р	Cardinality	Response codes	Description
N/A				204 No Content	The subscription resource was terminated successfully.
NOTE:	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.				

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
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]	
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	Р	Cardinality	Description	Applicability
self	Link	С	01	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	0	01	Identifies GPSI.	
exterGroupId	ExternalGroupId	0	01	Represents a group of users.	
acsInfo	AcsInfo	М	1	Contains the information of ACS.	
suppFeat	SupportedFeatur es	М	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.	

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	Feature Name	Description
number		

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 or the AMF or the UDM, 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

URI: {notificationDestination}

The operation shall support the URI variables defined in table 5.13.2.2-1.

Table 5.13.2.2-1: URI variables

Name	Definition
notificationDestination	A URI indicating the notification destination where N33 notification requests shall be delivered
	to.
	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	М	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	Р	Cardinality	Response	Description
			codes	
LocUpdateDataReply	M	1	200 OK	The notification is received successfully.
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.				

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		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	Р	Cardinality	Description	Applicability
gpsi	Gpsi	М	1	Generic Public Subscription identifier	
locInfo	LocationInfo	М	1	Represent user location information for exposure.	
lcsQosClass	LcsQosClass	М	1	LCS QoS Class.	
svcld	ServiceIdentity	0	01	Service Identity may be specified by the UE for LCS request.	
suppFeat	SupportedFeatures	М	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 5.13.3.3.1: Definition of type LocUpdateDataReply

Data type	Р	Cardinality	Description	Applicability
SupportedFeatures	M	1	Indicates the list of Supported	
			features used as described in	
			subclause 5.13.4.	
			SupportedFeatures M 1	

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 hosted in ETSI Forge, 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
  title: 3gpp-traffic-influence
  version: 1.1.0
  description:
    API for AF traffic influence
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.4.0; 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/vl'
    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
        - Traffic Influence Subscription
      responses:
        '200':
          description: OK.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/TrafficInfluSub'
        '400':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
   $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
   $ref: 'TS29122_CommonData.yaml#/components/responses/403'
   $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'
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)
                  '400':
                    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
                    $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'
                    $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)
          '400':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/400'
               $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'
       $ref: 'TS29122 CommonData.vaml#/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'
       $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:
   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'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      $ref: 'TS29122 CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      $ref: 'TS29122 CommonData.vaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    15031:
      $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'
    '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'
    4131:
      $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:
      description: OK. The subscription was modified successfully.
      content:
```

```
application/json:
              schema:
                $ref: '#/components/schemas/TrafficInfluSub'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          $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'
          $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:
         description: No Content (Successful deletion of the existing subscription)
        '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'
          $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.
         $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).
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        ipv4Addr:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Ipv4Addr'
        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.vaml#/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.
        websockNotifConfig:
         $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsockNotifConfig'
          $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'
          description: Identifies the N6 traffic routing requirement.
        tfcCorrInd:
          type: boolean
        tempValidities:
          type: array
          items:
            \verb| '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]
          - required: [ipv4Addr]
          - required: [ipv6Addr]
```

```
- required: [macAddr]
          - required: [qpsi]
          - 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'
          $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'
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
         $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'
         $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
        - OTHER: The application relocation fails due to other reason.
```

A.3 NiddConfigurationTrigger API

```
openapi: 3.0.0
info:
   title: 3gpp-nidd-configuration-trigger
   version: 1.0.0
   description: |
        API for NIDD Configuration Trigger.
        © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
        All rights reserved.
externalDocs:
   description: 3GPP TS 29.522 V16.4.0; 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'
        '200':
         description: Success
          content:
            application/json:
             schema:
                $ref: '#/components/schemas/NiddConfigurationTriggerReply'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
          $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'
          $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:
          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: 1.0.0
 description:
   API for Analytics Exposure.
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
   All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.4.0; 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.
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
        - Analytics Exposure Subscriptions
      parameters:
        - name: afId
          in: path
         description: Identifier of the AF
          required: true
          schema:
           type: string
        - name: supp-feat
          description: Features supported by the NF service consumer
          required: false
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      responses:
        '200':
          description: OK (Successful get all of the active subscriptions for the AF)
            application/json:
              schema:
                type: array
                  $ref: '#/components/schemas/AnalyticsExposureSubsc'
                minItems: 0
        14001:
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
          $ref: 'TS29122 CommonData.yaml#/components/responses/404'
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
          $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
      request.Body:
        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)
                  $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'
                  $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}:
 aet:
   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'
      '400':
       $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
       $ref: 'TS29122_CommonData.yaml#/components/responses/401'
       $ref: 'TS29122 CommonData.yaml#/components/responses/403'
      4041:
       $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:
          description: OK (Successful deletion of the existing subscription)
          content:
           application/json:
             schema:
                $ref: '#/components/schemas/AnalyticsExposureSubsc'
        12041:
          description: Successful case. The resource has been successfully updated 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'
          $ref: 'TS29122 CommonData.vaml#/components/responses/500'
        15031:
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    delete:
      summary: Deletes an already existing subscription
      taqs:
       - 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)
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
          $ref: 'TS29122 CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        5001:
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/default'
  /{afId}/fetch:
   post:
      summary: Fetch analytics information
        - 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/ison:
             schema:
                $ref: '#/components/schemas/AnalyticsData'
        '204':
         description: No Content (The requested Analytics data does not exist)
        '400':
         $ref: 'TS29122_CommonData.yaml#/components/responses/400'
         $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'
         $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'
         $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
    suppFeat:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
   - analyEventsSubs
    - notifUri
   - notifId
AnalyticsEventNotification:
  type: object
 properties:
   notifId:
     type: string
    analyEventNotifs:
     type: array
      items:
        $ref: '#/components/schemas/AnalyticsEventNotif'
     minItems: 1
  required:
    - notifId
    - analyEventNotifs
AnalyticsEventNotif:
  type: object
 properties:
   analvEvent:
     $ref: '#/components/schemas/AnalyticsEvent'
    timeStamp:
     $ref: 'TS29122_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
    abnormalInfos:
     type: array
      items:
       $ref: '#/components/schemas/AbnormalExposure'
     minItems: 1
    congestInfos:
     type: array
     items:
       $ref: '#/components/schemas/CongestInfo'
     minItems: 1
    nwPerfInfos:
     type: array
     items:
       $ref: '#/components/schemas/NetworkPerfExposure'
     minItems: 1
    qosSustainInfos:
     type: array
     items:
       $ref: '#/components/schemas/QosSustainabilityExposure'
     minItems: 1
  required:
    - analyEvent
    - timeStamp
AnalyticsEventSubsc:
 type: object
 properties:
   analyEvent:
     $ref: '#/components/schemas/AnalyticsEvent'
    analyEventFilter:
     $ref: '#/components/schemas/AnalyticsEventFilterSubsc'
    tatUe:
     $ref: '#/components/schemas/TargetUeId'
  required:
     analyEvent
AnalyticsEventFilterSubsc:
  type: object
 properties:
   nwPerfReqs:
     type: array
      items:
```

```
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NetworkPerfRequirement'
         minItems: 1
       locArea:
         $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
       appIds:
         type: array
         items:
           $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
         minItems: 1
       excepRegus:
         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'
         $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/QosRequirement'
       gosFlowRetThds:
         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
       ratio:
         $ref: 'TS29571_CommonData.yaml#/components/schemas/SamplingRatio'
       confidence:
         $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
     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'
         $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:
           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:
       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:
            \verb| $ref: 'TS29122_CommonData.yaml\#/components/schemas/LocationArea5G'| | TS29122_CommonData.yaml\#/components/schemas/LocationArea5G'| | TS29122_CommonData.yaml\#/components/schemas/LocationArea5G'| | TS29122_CommonData.yaml\#/components/schemas/LocationArea5G'| | TS29122_CommonData.yaml\#/components/schemas/LocationArea5G'| | TS29122_CommonData.yaml\#/components/schemas/LocationArea5G'| | TS29122_CommonData.yaml\#/components/schemas/LocationArea5G'| | TS29122_CommonData.yaml#/components/schemas/LocationArea5G'| | TS2912_CommonData.yaml#/components/schemas/LocationArea5G'| | TS2912_CommonData.yaml#/components/schemas/Schemas/Components/schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Schemas/Sche
        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
        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:
        cnaType:
           $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:
        - cnqType
        - tmWdw
        - nsi
QosSustainabilityExposure:
    type: object
    properties:
```

```
$ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
        startTs:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
        endTs:
         $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
        gosFlowRetThd:
          $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
    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.
```

A.5 5GLANParameterProvision API

```
openapi: 3.0.0
info:
  title: 3gpp-5glan-pp
  version: 1.0.0
  description:
   API for 5G LAN Parameter Provision.
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
   All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.4.0; 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.
  /{afId}/subscriptions:
    aet:
      summary: read all of the active subscriptions for the AF
        - 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:
              \verb| \$ref: '\#/components/schemas/5GLanParametersProvision'| \\
    '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'
     $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
     $ref: 'TS29122_CommonData.yaml#/components/responses/default'
post:
  summary: Creates a new subscription resource
  taqs:
    - 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:
         $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'
```

```
14291:
       $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      15001:
       $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      15031:
       $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
       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'
      '400':
       $ref: 'TS29122_CommonData.yaml#/components/responses/400'
       $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'
       $ref: 'TS29122_CommonData.yaml#/components/responses/429'
       $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      503:
       $ref: 'TS29122_CommonData.yaml#/components/responses/503'
     default:
       $ref: 'TS29122_CommonData.yaml#/components/responses/default'
   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:
           $ref: '#/components/schemas/5GLanParametersProvision'
   responses:
```

```
'200':
         description: OK (Successful deletion of the existing subscription)
         content:
           application/json:
              schema:
               $ref: '#/components/schemas/5GLanParametersProvision'
         description: Successful case. The resource has been successfully updated 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'
         $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'
         $ref: 'TS29122 CommonData.vaml#/components/responses/429'
        500:
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
         $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
   patch:
      summary: Partial updates an existing subscription resource
        - Individual 5GLAN Parameters Provision Subscription
     parameters:
        - name: afId
         in: path
         description: Identifier of the AF
         required: true
         schema:
           type: string
        - name: subscriptionId
         description: Identifier of the subscription resource
         required: true
         schema:
            type: string
      requestBody:
       required: true
       content:
          application/merge-patch+json:
             $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.
        '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'
         $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        500:
         $ref: 'TS29122_CommonData.yaml#/components/responses/500'
         $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
         description: Identifier of the subscription resource
         required: true
         schema:
           type: string
      responses:
        '204':
         description: No Content (Successful deletion of the existing subscription)
         $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
         $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
         $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'
         $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'
   5GLanParameters:
      type: object
     properties:
         $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
        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:
      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: 1.0.0
  description:
    API for applicying BDT policy
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
   All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.4.0; 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-appliying-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
        - Applied BDT Policy Subscription
      responses:
        '200':
          description: OK.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/AppliedBdtPolicy'
                minItems: 0
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        5001:
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
          $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'
       $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:
       description: OK (Successful get the active subscription)
       content:
         application/json:
           schema:
              $ref: '#/components/schemas/AppliedBdtPolicy'
      '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'
       $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'
      summary: Updates/replaces an existing subscription resource
        - 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.
        '400':
         $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
         $ref: 'TS29122_CommonData.yaml#/components/responses/401'
         $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'
         $ref: 'TS29122 CommonData.vaml#/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
        - Individual Applied BDT Policy Subscription
     responses:
        '204':
         description: No Content (Successful deletion of the existing subscription)
        '400':
         $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
         $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
         $ref: 'TS29122_CommonData.yaml#/components/responses/403'
         $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'
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      bdtRefId:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/BdtReferenceId'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - bdtRefId
      - suppFeat
    oneOf:
      - required: [gpsi]
      - required: [externalGroupId]
  AppliedBdtPolicyPatch:
    type: object
    properties:
      bdtRefId:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/BdtReferenceId'
    required:

    bdt.RefId
```

A.7 IPTVConfiguration API

```
openapi: 3.0.0
info:
  title: 3gpp-iptvconfiguration
  version: 1.0.0
 description:
   API for IPTV configuration.
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
   All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.4.0; 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.
  /{afId}/configurations:
    get:
      summary: read all of the active configurations for the AF
        - IPTV Configurations
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      responses:
          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
          $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'
       $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
      - 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'
       $ref: 'TS29122 CommonData.yaml#/components/responses/401'
      4031:
       $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'
      5001:
       $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:
        2001:
         description: OK (Successful get the active configuration)
           application/json:
             schema:
                $ref: '#/components/schemas/IptvConfigData'
        14001:
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
         $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
         $ref: 'TS29122 CommonData.vaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        500:
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
          $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'
         description: Successful case. The resource has been successfully updated 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'
         $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'
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    patch:
      summary: Partial updates an existing configuration resource
        - 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.
        400:
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
         $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
         $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          \verb| $ref: 'TS29122_CommonData.yaml\#/components/responses/default'| \\
      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)
        '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'
         $ref: 'TS29122 CommonData.vaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
         $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'
         $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        exterGroupId:
         $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        afAppId:
         type: string
        dnn:
         $ref: 'TS29571 CommonData.vaml#/components/schemas/Dnn'
        snssai:
         $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        multiAccCtrls:
         type: object
         additionalProperties:
            $ref: '#/components/schemas/MulticastAccessControl'
         minProperties: 1
        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'
      $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.
    - {\tt PREVIEW\_ALLOWED}\colon 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: 1.0.0
  description:
    API for Location Privacy Indication Parameters Provisioning.
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
   All rights reserved.
external Docs:
  description: 3GPP TS 29.522 V16.4.0; 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.
  /{afId}/provisionedLpis:
   get:
      summary: read all of the active LPI Parameters Provisioning resources for the AF
      taqs:
        - 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)
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/LpiParametersProvision'
                minItems: 1
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/404'
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        14291:
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        503:
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
          $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:
          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'
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
          $ref: 'TS29122 CommonData.yaml#/components/responses/404'
        4111:
          $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'
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
          $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
         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/ison:
              schema:
               $ref: '#/components/schemas/LpiParametersProvision'
        '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'
         $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
       - 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
         application/json:
           schema:
              $ref: '#/components/schemas/LpiParametersProvision'
         description: OK (Successful update of the existing resource)
          content:
           application/json:
             schema:
                $ref: '#/components/schemas/LpiParametersProvision'
         description: Successful case. The resource has been successfully updated and no additional
content is 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'
        14291:
         $ref: 'TS29122_CommonData.yaml#/components/responses/429'
         $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)
         $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
         $ref: 'TS29122 CommonData.vaml#/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'
         $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'
        exterGroupId:
         $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        gpsi:
         $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        lpi:
         $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/Lpi'
        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: 1.0.0
  description:
   API for AF service paramter
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
   All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.4.0; 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
                  $ref: '#/components/schemas/ServiceParameterData'
                minItems: 0
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
          $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'
      summary: Creates a new subscription resource
      taqs:
        - 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'
       $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'
       $ref: 'TS29122 CommonData.vaml#/components/responses/413'
      '415':
       $ref: 'TS29122_CommonData.yaml#/components/responses/415'
       $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
      - Individual Service Parameter Subscription
   responses:
      '200':
       description: OK (Successful get the active subscription)
         application/json:
           schema:
             $ref: '#/components/schemas/ServiceParameterData'
      '400':
       $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
       $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
       $ref: 'TS29122_CommonData.yaml#/components/responses/403'
       $ref: 'TS29122 CommonData.yaml#/components/responses/404'
      '406':
       $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
       $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      5001:
       $ref: 'TS29122_CommonData.yaml#/components/responses/500'
       $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:
     description: OK (Successful update of the subscription)
      content:
        application/json:
          schema:
           $ref: '#/components/schemas/ServiceParameterData'
    '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'
      $ref: 'TS29122 CommonData.vaml#/components/responses/500'
    15031:
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
patch:
  summary: Updates/replaces an existing subscription resource
  taqs:
    - 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'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      $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'
      summary: Deletes an already existing subscription
        - Individual Service Parameter Subscription
      responses:
        '204':
         description: No Content (Successful deletion of the existing subscription)
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
         $ref: 'TS29122 CommonData.vaml#/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:
   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'
         $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'
       suppFeat:
         $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
   ServiceParameterDataPatch:
      type: object
     properties:
       paramOverPc5:
         $ref: '#/components/schemas/ParameterOverPc5Rm'
```

A.10 ACSParameterProvision API

```
openapi: 3.0.0
info:
  title: 3gpp-acs-pp
  version: 1.0.0
  description:
    API for 5G ACS Parameter Provision.
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V16.4.0; 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
        - 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'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
          $ref: 'TS29122 CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
          $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'
       $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
       $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
       $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      14291:
       $ref: 'TS29122_CommonData.yaml#/components/responses/429'
       $ref: 'TS29122 CommonData.vaml#/components/responses/500'
      5031:
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
       $ref: 'TS29122_CommonData.yaml#/components/responses/default'
/{afId}/subscriptions/{subscriptionId}:
   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:
       description: OK (Successful get the active subscription)
       content:
```

```
application/json:
              schema:
                $ref: '#/components/schemas/AcsConfigurationData'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          $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'
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      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:
              $ref: '#/components/schemas/AcsConfigurationData'
      responses:
        12001:
          description: OK (Successful update of the existing subscription)
          content:
           application/ison:
              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.
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
         $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
          $ref: 'TS29122 CommonData.vaml#/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'
          $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
         - 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)
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          $ref: 'TS29122 CommonData.vaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
          $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'
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        acsInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AcsInfo'
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:

    acsInfo

        - suppFeat
```

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MoLcsNotify API A.11

```
openapi: 3.0.0
 title: 3gpp-mo-lcs-notify
 version: 1.0.0
 description:
   API for UE updated location information notification.
   © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
   All rights reserved.
externalDocs:
 description: 3GPP TS 29.522 V16.4.0; 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'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          $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'
          $ref: 'TS29122 CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        15031:
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
          $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'
        lcsOosClass:
          $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

Date	Meeting	TDoc.	CR	Rev	Cat	Subject/Comment	New
2018-03	CT3#95	1000.	OIX	IXCV	Jac	TS Skeleton	0.0.0
2018-03	CT3#95					Inclusion of C3-181332 and TS skeleton of Network	0.1.0
	0.000					Exposure Function Northbound APIs in C3-181362.	01110
2018-04	CT3#96					Inclusion of C3-182407, C3-182408, C3-182504,	0.2.0
						C3-182418, C3-182505, C3-182443, C3-182421,	
						C3-182422, C3-182501 and editorial changes from	
						Rapporteur.	
2018-05	CT3#97					Inclusion of C3-183187, C3-183773, C3-183774,	0.3.0
						C3-183553, C3-183826, C3-183329, C3-183776,	
						C3-183827, C3-183778, C3-183605 and editorial	
						changes from Rapporteur.	
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
	0=::0::	05 (00)			1_	N== 11 11 11 11 11 11 11 11 11 11 11 11 1	
2018-09	CT#81	CP-182015	0002	-	F	Corrections on NEF Northbound interface	15.1.0
2010.00	07/10/	05 100015	0000	-	-	T (" " ABLO ABL	45.4.0
2018-09	CT#81	CP-182015	0003	1	F	TrafficInfluence API OpenAPI schema	15.1.0
2040.00	CT#04	CD 400045	0004	4	-	A F influence traffic resiting alconom	45 4 0
2018-09	CT#81	CP-182015	0004	1	F	AF influence traffic routing cleanup	15.1.0
2018-09	CT#81	CP-182031	0005	1	F	Definition of Changing the Chargeable Party	15.1.0
2010-09	C1#61	CP-162031	0005	'	-	procedures and API	15.1.0
2018-09	CT#81	CP-182031	0006	1	F	Definition of setting up an AS session with required	15.1.0
2010-09	C1#61	CF-102031	0000	'		QoS procedure and API	15.1.0
2018-09	CT#81	CP-182015	0007	2	F	Resource structure update	15.1.0
2010-03	01#01	01 -102013	0007	_	'	Nesource structure apaate	13.1.0
2018-09	CT#81	CP-182015	0008	1_	F	Procedures for monitoring – Reference	15.1.0
20.000	01,701	0. 102010	0000			Treesadies for meriting Treeserence	10.1.0
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	15.1.0
						influence	
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
2010 10	07//00	05 400005	0015		-	E . 15 C.11	45.00
2018-12	CT#82	CP-183205	0015	2	F	ExternalDocs field	15.2.0
2010 12	CT#02	CD 402205	0010		-	Default value for apiRoot	15 2 0
2018-12	CT#82	CP-183205	0019	-	F	Default value for apircoot	15.2.0
2018-12	CT#82	CP-183205	0021	4	F	Correct traffic route and Ethernet flow data type	15.2.0
2010-12	C1#62	CF-103203	0021	4		Correct trainic route and Ethernet now data type	13.2.0
2018-12	CT#82	CP-183205	0022	1	F	Event correction for AF influence traffic routing	15.2.0
2010-12	01#02	01 -103203	0022	'	'	Event correction for At influence traine routing	10.2.0
2018-12	CT#82	CP-183205	0024	1	F	Supporting Ethernet UE in Chargeable Party and AF	15.2.0
20.0.2	01,702	0. 100200	002 .	1		session with QoS	10.2.0
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	15.2.0
		<u> </u>				Required QoS	
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
				1 -	I —	TO CONTRACT OF A POLICE A POLI	1 4 = 0 0
2018-12	CT#82	CP-183205	0030	1	F	Status code update for TrafficInfluence API	15.2.0
	CT#82	CP-183205 CP-183205	0030	3	F	UE information during notification	15.2.0

2018-12	CT#82	CP-183205	0017	2	F	Error status codes for HTTP response	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	0023	2	F	Correction to the AF influence traffic steering control	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	Clarification of default value for boolean data type	15.2.0
2018-12	CT#82	CP-183205	0027	2	F	Security adaptation for Nnef northbound APIs with CAPIF	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 mandatory 5G features	15.3.0
2019-03	CT#83	CP-190116	0041	-	F	OpenAPI 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-191090	0047	1	В	Support of external group Id	16.0.0
2019-06	CT#84	CP-191070	0043	2	В	Nnef_MSISDN-less_MO_SMS service	16.0.0
2019-06	CT#84	CP-191070	0044	2	В	Application function notification of downlink data delivery status	16.0.0
2019-06	CT#84	CP-191070	0045	2	В	Availability after DDN failure notification for multiple Afs	16.0.0
2019-06	CT#84	CP-191070	0050	2	В	Network parameter provisioning support	16.0.0
2019-06	CT#84	CP-191070	0051	3	В	NIDD configuration and delivery in 5G	16.0.0
2019-06	CT#84	CP-191229	0054	5	В	AF acknowledgement of UP path event notification	16.0.0
2019-06	CT#84	CP-191071	0055	2	В	UE IP address preservation indication	16.0.0
2019-06	CT#84	CP-191104	0056	1	В	PFD management notification	16.0.0
2019-06	CT#84	CP-191100	0057	1	В	NEF stored exposure data	16.0.0
2019-06	CT#84	CP-191105	0058	1	В	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	В	Support a set of MAC addresses in traffic filter	16.1.0
2019-09	CT#85	CP-192165	0066	1	В	Support parameter provisioning in RACS	16.1.0
2019-09	CT#85	CP-192157	0067	2	В	Accurate UE moving trajectory definition	16.1.0
-	•					•	

2019-09	CT#85	CP-192157	0069	2	В	Procedures for Nnef_AnalyticsExposure Service	16.1.0
2019-09	CT#85	CP-192157	0070	2	В	API definition for Nnef_AnalyticsExposure Service	16.1.0
2019-09	CT#85	CP-192170	0071	1	В	Procedures for 5G LAN type sevice over northbound interface	16.1.0
2019-09	CT#85	CP-192170	0072	2	В	API definition for 5G LAN type service over northbound interface	16.1.0
2019-09	CT#85	CP-192169	0073	2	В	PFD management partial failure	16.1.0
2019-09	CT#85	CP-192157	0074	1	В	Cancel the BDT warning notification	16.1.0
2019-09	CT#85	CP-192219	0075	2	В	Notification of downlink data delivery status	16.1.0
2019-09	CT#85	CP-192179	0076	2	В	Applying BDT policy	16.1.0
2019-09	CT#85	CP-192152	0077	2	В	API definition for Nnef_IPTVconfiguration service	16.1.0
2019-09	CT#85	CP-192137	0079	-	В	Nnef_ECRestriction service	16.1.0
2019-09	CT#85	CP-192137	0080	-	В	Differences betwwen 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	В	AF acknowledgement of UP path event notification	16.1.0
2019-09	CT#85	CP-192138	0083	-	В	Successul AF acknowledgement without N6 traffic routing information	16.1.0
2019-09	CT#85	CP-192173	0084	-	F	OpenAPI version update for TS 29.522 Rel-16	16.1.0
2019-09	CT#85	CP-192251	0085	1	В	Procedures for Nnef_IPTVconfiguration service	16.1.0
2019-12	CT#86	CP-193179	0086	1	В	Nnef_APISupportCapability Service	16.2.0
2019-12	CT#86	CP-193181	0087	-	В	OpenAPI file update to support AF acknowledgement	16.2.0
2019-12	CT#86	CP-193179	0088	1	В	Scheduled communication type	16.2.0
2019-12	CT#86	CP-193181	0089	1	F	Open issue for AddrPreservation feature	16.2.0
2019-12	CT#86	CP-193222	0090	1	В	Partial update for 5GLANParameterProvision API	16.2.0
2019-12	CT#86	CP-193222	0091	2	В	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	3	В	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	F	Partial update of IPTVConfiguration API	16.2.0
2019-12	CT#86	CP-193191	0100	2	В	OpenAPI file of IPTVConfiguration API	16.2.0
2019-12	CT#86	CP-193198	0101	3	В	AnalyticsEventNotif and AnalyticsExposureSubsc Data types	16.2.0
2019-12	CT#86	CP-193198	0102	-	В	Open issue for AnalyticsEvent data type	16.2.0
2019-12	CT#86	CP-193198	0103	1	В	Partial update of Nnef_AnalyticsExposure API	16.2.0
2019-12	CT#86	CP-193198	0104	2	В	Nnef_AnalyticsExposure_fetch service operation	16.2.0
				i			

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	-	В	URI structure for N33 APIs	16.2.0
2019-12	CT#86	CP-193198	0107	-	В	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	А	make the storage of traffic influence request in the UDR mandatory	16.2.0
2019-12	CT#86	CP-193223	0113	1	F	missing required in ApplyingBdtPolicy API file	16.2.0
2019-12	CT#86	CP-193188	0115	-	А	Correct cardinality in traffic influence	16.2.0
2019-12	CT#86	CP-193198	0116	1	F	Feature name correction for BDT notification	16.2.0
2020-03	CT#87e	CP-200207	0118	-	В	DNN Clarification	16.3.0
2020-03	CT#87e	CP-200198	0119	1	В	Update of the Availability after DDN Failure event	16.3.0
2020-03	CT#87e	CP-200198	0120	1	В	Update of the DDD status event	16.3.0
2020-03	CT#87e	CP-200212	0122	1	В	Procedure of Nnef_ServiceParameter service	16.3.0
2020-03	CT#87e	CP-200212	0123	1	В	Resources and data types of Nnef_ServiceParameter service	16.3.0
2020-03	CT#87e	CP-200266	0124	3	В	OpenAPI file of Nnef_ServiceParameter service	16.3.0
2020-03	CT#87e	CP-200202	0125	1	В	QoS Monitoring Report	16.3.0
2020-03	CT#87e	CP-200218	0126	1	В	Indication of traffic correlation	16.3.0
2020-03	CT#87e	CP-200203	0127	1	В	Clarification of IPTV configuration	16.3.0
2020-03	CT#87e	CP-200198	0128	-	F	Correct TS number for NEF southbound NIDD service	16.3.0
2020-03	CT#87e	CP-200198	0129	-	В	Support PDU session status	16.3.0
2020-03	CT#87e	CP-200137	0130	2	F	Correct UE mobility and communication	16.3.0
2020-03	CT#87e	CP-200208	0131	1	В	Support network performance analytics	16.3.0
2020-03	CT#87e	CP-200208	0132	1	В	Support BDT policy candidates in notification	16.3.0
2020-03	CT#87e	CP-200212	0133	1	В	Add alternative QoS requirements	16.3.0
2020-03	CT#87e	CP-200142	0134	2	В	Support QoS sustainability analytics	16.3.0
2020-03	CT#87e	CP-200218	0135	-	F	Definition of 5GLanParametersProvision	16.3.0
2020-03	CT#87e	CP-200203	0136	-	F	Definition of IptvConfigData	16.3.0
2020-03	CT#87e	CP-200219	0137	-	F	Usage of the "bdtRefld" property	16.3.0
2020-03	CT#87e	CP-200215	0138	-	F	Miscellaneous errors	16.3.0
2020-03	CT#87e	CP-200259	0140	3	В	UE Location Privacy Setting in NEF	16.3.0
2020-03	CT#87e	CP-200237	0142	2	В	AnalyticsExposure API, Analytics Event Filter associated with all events	16.3.0
2020-03	CT#87e	CP-200208	0143	1	В	AnalyticsExposure API, support of abnormal behaviour	16.3.0
L	1	1	i .	Ī	i	1	i .

2020-03	CT#87e	CP-200208	0144	1	В	AnalyticsExposure API, support of data congestion	16.3.0
2020-03	CT#87e	CP-200216	0145	-	F	Update of OpenAPI version and TS version in externalDocs field	16.3.0
2020-06	CT3#88e	CP-201243	0148	1	F	Missing mapping in the overview	16.4.0
2020-06	CT3#88e	CP-201238	0149	2	F	Wrong datatypes Datatime and Plmn	16.4.0
2020-06	CT3#88e	CP-201234	0150	1	F	Wrong datatype referred in analytics exposure procedure	16.4.0
2020-06	CT3#88e	CP-201228	0151	1	В	Procedure of ACS Information Configuration	16.4.0
2020-06	CT3#88e	CP-201228	0152	1	В	Resources and data types of Nnef_ACSParameterProvision service	16.4.0
2020-06	CT3#88e	CP-201339	0153	4	В	OpenAPI file of Nnef_ACSParameterProvision service	16.4.0
2020-06	CT3#88e	CP-201235	0159	1	F	Loss of connectivity reason	16.4.0
2020-06	CT3#88e	CP-201235	0161	1	F	Any UE clarification	16.4.0
2020-06	CT3#88e	CP-201252	0162	1	F	Correction to 5GLANParameterProvision API	16.4.0
2020-06	CT3#88e	CP-201228	0163	1	F	Correction to IPTVConfiguration API	16.4.0
2020-06	CT3#88e	CP-201253	0164	1	F	Correction to ApplyingBdtPolicy API	16.4.0
2020-06	CT3#88e	CP-201252	0165	1	F	Open issue for 5GLanParametersProvisionPatch	16.4.0
2020-06	CT3#88e	CP-201195	0167	6	В	Supporting the Location Services in NEF in TS 29.522	16.4.0
2020-06	CT3#88e	CP-201235	0169	1	F	Periodic reporting by Nnef	16.4.0
2020-06	CT3#88e	CP-201252	0170	3	F	Clarify nullable attributes used in PATCH	16.4.0
2020-06	CT3#88e	CP-201244	0171	1	F	Storage of YAML files in ETSI Forge	16.4.0
2020-06	CT3#88e	CP-201178	0172	2	F	Confidence of analytics results for Nnef_AnalyticsExposure service	16.4.0
2020-06	CT3#88e	CP-201238	0173	-	В	Complete ServiceParameter API	16.4.0
2020-06	CT3#88e	CP-201276	0174	1	F	Traffic descriptor for xBDT	16.4.0
2020-06	CT3#88e	CP-201213	0175	1	F	Corrections related to URLLC	16.4.0
2020-06	CT3#88e	CP-201228	0177	-	F	Clarify unmodifiable attribute in PUT	16.4.0
2020-06	CT3#88e	CP-201234	0178	1	F	Optional target UE	16.4.0
2020-06	CT3#88e	CP-201246	0179	1	F	Move 5G specific procedure to TS 29.522	16.4.0
2020-06	CT3#88e	CP-201210	0180	1	F	Interaction with UDM for Enhanced Coverage Restriction Control	16.4.0
2020-06	CT3#88e	CP-201210	0181	1	В	Support of Enhanced Coverage Mode control	16.4.0
2020-06	CT3#88e	CP-201234	0182	-	F	Support of immediate reporting for Nnef_AnalyticsExposure service	16.4.0
2020-06	CT3#88e	CP-201246	0183	1	F	Corrections to apiVersion	16.4.0
2020-06	CT3#88e	CP-201246	0184	1	F	Corrections to error status code	16.4.0
2020-06	CT3#88e	CP-201274	0185	1	В	AF provides AAA server address	16.4.0
2020-06	CT3#88e	CP-201246	0186	1	F	Updates to IP address	16.4.0
2020-06	CT3#88e	CP-201234	0187	2	F	Update to reporting information	16.4.0
	1			1			1

2020-06	CT3#88e	CP-201234	0188	1	F	Ratio of analytics results for Nnef_AnalyticsExposure service	16.4.0
2020-06	CT3#88e	CP-201234	0189	-	F	Supported features definition for Nnef_AnalyticsExposure service	16.4.0
2020-06	CT3#88e	CP-201234	0190	1	F	Corrections on target UE information for Nnef_AnalyticsExposure service	16.4.0
2020-06	CT3#88e	CP-201246	0191	1	F	Corrections on tags field for NEF Northbound APIs	16.4.0
2020-06	CT3#88e	CP-201234	0192	1	F	Support of network performance for Nnef_AnalyticsExposure service	16.4.0
2020-06	CT3#88e	CP-201234	0193	1	F	Data type used in fetch the analtyics	16.4.0
2020-06	CT3#88e	CP-201235	0194	1	F	Supported headers, Resource Data type and Operation Name	16.4.0
2020-06	CT3#88e	CP-201255	0195	-	F	Update of OpenAPI version and TS version in externalDocs field	16.4.0
2020-06	CT3#88e	CP-201336	0196	1	F	Remove the Abnormal_Behaviour applicability for ueMobilityInfos in AnalyticsData	16.4.0

History

	Document history								
V16.4.0	August 2020	Publication							