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Foreword

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

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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], 3GPP TS 23.288 [29] and 3GPP TS 23.548 [42].

2 References

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

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

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 23.502: "Procedures for the 5G system".
- [3] 3GPP TS 23.501: "System Architecture for the 5G".
- [4] 3GPP TS 29.122: "T8 reference point for northbound Application Programming Interfaces (APIs)".
- [5] OpenAPI: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0>.
- [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] Void
- [17] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".
- [18] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".
- [19] 3GPP TS 29.554: "5G System; Background Data Transfer Policy Control Service; Stage 3".
- [20] 3GPP TS 29.504: "5G System; Unified Data Repository Services; Stage 3".
- [21] 3GPP TR 21.900: "Technical Specification Group working methods".
- [22] 3GPP TS 29.523: "5G System; Policy Control Event Exposure Service; Stage 3".

- [23] 3GPP TS 29.519: "5G System; Usage of the Unified Data Repository service for Policy Control Data, Application Data and Structured Data for Exposure; Stage 3".
- [24] 3GPP TS 29.541: "5G System; Network Exposure (NE) function services for Non-IP Data Delivery (NIDD); Stage 3".
- [25] 3GPP TS 29.542: "5G System, Session management services for Non-IP Data Delivery (NIDD); Stage 3".
- [26] 3GPP TS 29.508: "5G System; Session Management Event Exposure Service; Stage 3".
- [27] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".
- [28] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G system (5GS)".
- [29] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".
- [30] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".
- [31] Void
- [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)".
- [37] 3GPP TS 33.535: "Authentication and Key Management for Applications (AKMA) based on 3GPP credentials in the 5G System (5GS)".
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- [39] 3GPP TS 33.220: "Generic Authentication Architecture (GAA); Generic Bootstrapping Architecture (GBA)".
- [40] IETF RFC 7542: "The Network Access Identifier".
- [41] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".
- [42] 3GPP TS 23.548: "5G System Enhancements for Edge Computing; Stage 2".
- [43] 3GPP TS 29.534: "5G System; Access and Mobility Policy Authorization Service; Stage 3".
- [44] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".
- [45] IEEE Std 1588-2019: "IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control".
- [46] IEEE Std 802.1AS-2020: "IEEE Standard for Local and metropolitan area networks--Timing and Synchronization for Time-Sensitive Applications".
- [47] 3GPP TS 29.536: "5G System; Network Slice Admission Control Services; Stage 3".
- [48] 3GPP TS 24.526: "User Equipment (UE) policies for 5G System (5GS); Stage 3".
- [49] 3GPP TS 24.555: "Proximity based services (ProSe) in 5G system (5GS); User Equipment (UE) policies; Stage 3".
- [50] 3GPP TS 29.565: "5G System; Time Sensitive Communication and Time Synchronization Function Services; Stage 3".
- [51] IEEE 802.1Q: "Virtual Bridged Local Area Networks".

- [52] 3GPP TS 29.532: "5G System; 5G Multicast-Broadcast Session Management Services; Stage 3".
- [53] 3GPP TS 23.247: "Architectural enhancements for 5G multicast-broadcast services; Stage 2".
- [54] IETF RFC 6733: "Diameter Base Protocol".

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].

Application AM context: Information about the capabilities that an AF application requires from the access network for a registered UE. It is established by the AF before or during the use of the service that requires it.

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].

A-KID	AKMA Key Identifier
A-TID	AKMA Temporary UE Identifier
AAAnF	AKMA Anchor Function
ACS	Auto-Configuration Server
AF	Application Function
AKMA	Authentication and Key Management for Applications
AM	Access and Mobility management
BDT	Background Data Transfer
CAPIF	Common API Framework
CP	Communication Pattern
DN	Data Network
DNAI	DN Access Identifier
DNN	Data Network Name
EAS	Edge Application Server
ECS	Edge Configuration Server
FQDN	Fully Qualified Domain Name
GMLC	Global Mobile Location Centre
GPSI	Generic Public Subscription Identifier
IPTV	Internet Protocol Television
K _{AF}	AKMA Application Key
MBS	Multicast/Broadcast Service
MB-SMF	Multicast/Broadcast Session Management Function
MO-LR	Mobile Originated Location Request
NEF	Network Exposure Function
NSAC	Network Slice Admission Control
NSACF	Network Slice Admission Control 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
SSM	Source Specific IP Multicast address
TAI	Traffic Area Identity

TMGI	Temporary Mobile Group Identity
TSC	Time Sensitive Communication
TSCAI	Time Sensitive Communication Assistance Information
TSCTSF	Time Sensitive Communication and Time Synchronization Function
UDR	Unified Data Repository
UP	User Plane
URSP	UE Route Selection Policy
WB	Wide Band

4 NEF Northbound Interface

4.1 Overview

The NEF Northbound interface is between the NEF and the AF. It specifies RESTful/RPC 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], and in 3GPP TS 23.247 [53] for MBS specific aspects.

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, Location Privacy Indication Parameters Provisioning and ECS address 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
- 18) Procedures for AKMA
- 19) Procedures for AF triggered Access and Mobility Influence

- 20) Procedures for AF triggered Access and Mobility Policy Authorization
- 21) Procedures for Time Synchronization Exposure
- 22) Procedures for EAS Deployment information provisioning
- 23) Procedures for TMGI allocation, deallocation, expiry timer refresh and timer expiry notification
- 24) Procedures for MBS session creation, update and deletion.
- 25) Procedures for AF specific UE ID retrieval.

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_UCMFP provisioning service
- 17) Nnef_Location service
- 18) Nnef_AKMA service
- 19) Nnef_AMInfluence service
- 20) Nnef_AMPolicyAuthorization service
- 21) Nnef_TimeSynchronization service
- 22) Nnef_EASDeployment service
- 23) Nnef_MBSTMGI service
- 24) Nnef_MBSSession service
- 25) Nnef_UEId service

NOTE 1: For Nnef_PFDManagement service, only the Nnef_PFDManagement_Create/Update/Delete service operations are applicable for the NEF Northbound interface.

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

NOTE 3: For Nnef_NIDDConfiguration service, the Nnef_NIDDConfiguration_Trigger service operation is only applicable for the NEF Northbound interface.

NOTE 4: The Nnef_APISupportCapability service is only applicable in the MonitoringEvent API when the monitoring type sets to "API_SUPPORT_CAPABILITY".

4.2 Reference model

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

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

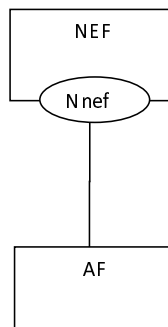


Figure 4.2-1: Reference Architecture for the Nnef Service; SBI representation



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

4.3 Functional elements

4.3.1 NEF

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

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

- The NEF may provide means for the AF to influence access and mobility management related policies.
- The NEF may provide means for the AF to provide inputs that can be used by the PCF for deciding access and mobility management related policies.
- The NEF may provide means for the AF to provide the EAS Deployment information.
- The NEF may provide means for the AF to retrieve AF specific UE ID.

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], and in 3GPP TS 23.247 [53] for MBS specific aspects, 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;
- when "monitoringType" sets to "LOCATION_REPORTING" within the MonitoringEventSubscription data type as defined in subclause 5.3.2.1.2 of 3GPP TS 29.122 [4] during the monitoring event subscription, only "CGI_ECGI", "TA_RA", "GEO_AREA" and "CIVIC_ADDR" within the Accuracy data type as defined in subclause 5.3.2.4.7 of 3GPP TS 29.122 [4], are applicable for 5G MonitoringEvent API.
- after validation of the AF request, the NEF may determine a monitoring expiry time, based on operator policy and take into account the monitoring expire time if included in the request; and the NEF may provide a expiry time (determined by the NEF, UDM or AMF) to the AF even the AF does not provided before.
- if the "Loss_of_connectivity_notification" as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, values 0-5 are not applicable for the lossOfConnectReason attribute within MonitoringEventReport data type, the lossOfConnectReason attribute shall be set to 6 if the UE is deregistered, 7 if the maximum detection timer expires or 8 if the UE is purged.

- the AF may include a periodic reporting time indicated by the "repPeriod" attribute within MonitoringEventSubscription data type, which is only applicable for Location_notification, Number_of_UEs_in_an_area_notification_5G and NSAC features in the NEF.
- if the "locationType" attribute sets to "LAST_KNOWN_LOCATION", the "maximumNumberOfReports" attribute shall set to 1 as a One-time Monitoring Request.

description about the PDN connectivity status event applies to the PDU session status event, the description of the MME/SGSN applies to the SMF during the reporting of monitoring event procedure, the NEF receives the event notification via Nsmf_EventExposure service as defined in 3GPP TS 29.508 [26];

- If the "Session_Management_Enhancement" feature as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, the "dnn" and/or "snsai" may be provided in MonitoringEventSubscription data type for monitoring type provided "PDN_CONNECTIVITY_STATUS" or "DOWNLINK_DATA_DELIVERY_STATUS".
- when sending the UDM/AMF/SMF event report to the AF, the NEF may store the event data in the report in the UDR as part of the data for exposure as specified in 3GPP TS 29.519 [23] by using Nudr_DataRepository service as specified in 3GPP TS 29.504 [20].
- If the "Downlink_data_delivery_status_5G" as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support the downlink data delivery status notification,
 - the AF shall send an HTTP POST message to the NEF to the resource "Monitoring Event Subscriptions" as defined in subclause 5.3.3.2 of 3GPP TS 29.122 [4] for creating an subscription or send an HTTP PUT message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in subclause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription with the following difference:
 - within the MonitoringEventSubscription data structure the AF may additionally include packet filter descriptor(s) within the "dddTraDescriptors" attribute and the list of monitoring downlink data delivery status event(s) within the "dddStati" attribute;
 - the NEF shall subscribe the events to the appropriate UDM(s) within the network by invoking the Nudm_EventExposure_Subscribe service operation as defined in subclause 5.5.2.2 of 3GPP TS 29.503 [17].
 - If the "Partial_group_modification" as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support partial cancellation or addition of certain UE(s) within the active group event subscription, the NEF shall map the "excludedExternalIds" and/or "excludedMsisdns" attributes to the "excludeGpsiList" attribute for the partial group cancellation, or shall map the "addedExternalIds" and/or "addedMsisdns" attributes to the "includeGpsiList" attribute within the Nudm_EventExposure service.
 - when the NEF receives the event notification as defined in subclause 4.4.2 of 3GPP TS 29.508 [26], the NEF shall send an HTTP POST message to the AF as defined in subclause 4.4.2.3 of 3GPP TS 29.122 [4] with the difference that within each MonitoringEventReport data structure, the NEF shall include:
 - the downlink data delivery status within the "dddStatus" attribute;
 - the downlink data descriptor impacted by the downlink data delivery status change within the "dddTraDescriptor" attribute;
 - the estimated buffering time within the "maxWaitTime" attribute if the downlink data delivery status is set to "BUFFERED";
 - If the "Availability_after_DDN_failure_notification_enhancement" feature as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, the AF shall send an HTTP POST message to the NEF to the resource "Monitoring Event Subscriptions" as defined in subclause 5.3.3.2 of 3GPP TS 29.122 [4] for creating an subscription or send an HTTP PUT message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in subclause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription with the difference that within the MonitoringEventSubscription data structure, the AF shall include packet filter descriptions within the "dddTraDescriptors" attribute.
- If the "eLCS" feature as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, the AF may send an HTTP POST message to the NEF to the resource "Monitoring Event Subscriptions" as defined in subclause 5.3.3.2 of 3GPP TS 29.122 [4] for creating an subscription or send an HTTP PUT message to the NEF

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

- within the MonitoringEventSubscription data structure, the AF may additionally include location QoS requirement within the "locQoS" attribute, the service identifier within the "svcId" attribute, Location deferred requested event type within the "ldrType" attribute, the validity start time and the validity end time within the "locTimeWindow" attribute, the maximum age of location estimate within the "maxAgeOfLocEst" attribute, the requesting target UE velocity within the "velocityRequested" attribute, the linear distance within the "linearDistance" attribute, the reporting target UE location estimate indication within the "reportingLocEstInd" attribute, the sampling interval within the "samplingInterval" attribute, the maximum reporting expire interval within the "maxRptExpireIntvl" attribute, the supported GAD shapes within the "supportedGADShapes" attribute, the Code word within the "codeword" attribute, and other attributes as defined in subclause 5.3.2.3.2 of 3GPP TS 29.122 [4] for location information subscription; The MonitoringEventSubscription data structure may also include the "locationArea5G" attribute containing only the "geographicAreas" attribute and the "accuracy" attribute set to the value "GEO_AREA". If the "MULTIQOS" feature is also supported, Multiple QoS Class is supported in the "lcsQoSClass" attribute within the "locQoS" attribute for deferred MT-LR.
- if the NEF identifies the location request precision higher than cell level location accuracy is required based on the "locQoS" attribute received, the NEF shall interact with the appropriate GMLC within the network by invoking the Ngmlc_Location_ProvideLocation service operation as defined in subclause 6.1 of 3GPP TS 29.515 [35];
- if the location request precision is lower than or equal to cell level, based on implementation, the NEF may interact with the GMLC by invoking the Ngmlc_Location_ProvideLocation service operation as defined in subclause 6.1 of 3GPP TS 29.515 [35]; or retrieve the UE location privacy information from the UDM by using Nudm_SDM service as described in subclause 5.2 of 3GPP TS 29.503 [17] and if the privacy setting is verified, the NEF shall interact with the UDM for the serving AMF address by invoking the Nudm_UECM service as described in subclause 5.3 of 3GPP TS 29.503 [17]. After receiving the serving AMF address from the UDM, the NEF shall interact with the AMF by invoking the Namf_EventExposure_Subscribe service operation as defined in subclause 5.3 of 3GPP TS 29.518 [18]; or may interact with UDM by using Nudm_EventExposure service as defined in subclause 5.5 of 3GPP TS 29.503 [17] and the NEF receives the location event notification from the AMF via Namf_EventExposure service as defined in in subclause 5.5 of 3GPP TS 29.518 [18].
- Based on the received AF information and local authorization policy, the NEF shall derive the LCS client type with a suitable enumeration value for the AF location request, to be provided as the "externalClientType" attribute when invoking the Ngmlc_Location_ProvideLocation service operation as defined in subclause 6.1 of 3GPP TS 29.515 [35].

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

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

- If the "NSAC" feature defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support the network slice status reporting:
 - the AF shall send an HTTP POST request to the NEF to the "Monitoring Event Subscriptions" resource as defined in subclause 5.3.3.2.3.4 of 3GPP TS 29.122 [4] to create a subscription, or send an HTTP PUT message to the NEF to the "Individual Monitoring Event Subscription" resource as defined in subclause 5.3.3.3.3.2 of 3GPP TS 29.122 [4] to update an existing subscription with the following differences:
 - within the MonitoringEventSubscription data structure,

- a) the concerned network slice identified by the "snssai" attribute shall be provided;
 - b) the value of the "monitoringType" attribute shall be set to "NUM_OF_REGD_UES" to indicate that the AF requests to be notified of the current number of registered UEs for the network slice or "NUM_OF_ESTD_PDU_SESSIONS" to indicate that the AF requests to be notified of the current number of established PDU Sessions for the network slice;
 - c) the "maximumNumberOfReports" attribute set to a value of 1 shall be provided, if one-time reporting of the current network slice status information is requested;
 - d) if one-time reporting is not requested, either a targeted reporting threshold within the "tgtNsThreshold" attribute (if threshold based reporting is requested) or a reporting periodicity within the "repPeriod" attribute (if periodic reporting is requested) shall be provided;
 - e) if periodic reporting is requested, the "nsRepFormat" attribute shall be provided to indicate the requested reporting format (i.e. numerical or percentage); and
 - f) the "immediateRep" attribute set to "true", if immediate reporting of the current network slice status information is requested or one-time reporting of the current network slice status information is requested;
- the NEF shall then further interact with the concerned NSACF(s) to create or update the associated subscription(s) to notifications by invoking the Nnsacf_SliceEventExposure_Subscribe service operation as specified in 3GPP TS 29.536 [47]. After receiving a successful response from the NSACF, the NEF shall:

NOTE 1: If multiple NSACFs are selected for the requested S-NSSAI, the NEF can set the event reporting type to periodic in its request to these NSACFs, irrespective of the requested reporting type by the AF (i.e. threshold based reporting or periodic reporting).

- for the HTTP POST request, respond to the AF as defined in subclause 5.3.3.2.3.4 of 3GPP TS 29.122 [4] with either;
 - a "201 Created" status code and the response body containing the created "Individual Monitoring Event Subscription" resource within the MonitoringEventSubscription data structure. The NEF shall include the current network slice status information received from the NSACF within the "monitoringEventReport" attribute, if available and the "immediateRep" attribute was provided and set to "true" in the request; or
 - a "200 OK" status code and the response body containing the current network slice status information received from the NSACF within the "MonitoringEventReport" data structure, if it is a one-time reporting request with the "immediateRep" attribute set to "true";
- for the HTTP PUT request, respond to the AF with a "200 OK" status code as defined in subclause 5.3.3.3.2 of 3GPP TS 29.122 [4] and the response body including the MonitoringEventSubscription data structure containing a representation of the updated "Individual Monitoring Event Subscription" resource. The NEF shall include the current network slice status information received from the NSACF within the "monitoringEventReport" attribute, if available and the "immediateRep" attribute was provided and set to "true" in the request.

NOTE 2: When the "maximumNumberOfReports" attribute is provided and set to a value of 1 and the "immediateRep" attribute is provided and set to "true", the Individual Monitoring Event Subscription is immediately terminated after returning the current network slice status information in the HTTP POST response body.

NOTE 3: After sending a subscription creation request for network slice status reporting with a particular reporting format (e.g. percentage) for periodic reporting, an AF cannot send a subsequent subscription creation request for the same network slice with a different reporting format (e.g. numerical) for periodic reporting.

- when the NEF receives event report(s) from the NSACF(s) as defined in 3GPP TS 29.536 [47], the NEF shall notify the AF via an HTTP POST message as defined in subclause 5.3.3a.2.3 of 3GPP TS 29.122 [4] with the following differences:
 - within the MonitoringEventReport data type of the MonitoringNotification data type,

- the value of the "monitoringType" attribute shall be set to "NUM_OF_REGD_UES" or "NUM_OF_ESTD_PDU_SESSIONS" (i.e. the same value received during the HTTP POST or PUT request that created or modified the subscription);
- the current network slice status information as the "nSStatusInfo" attribute shall be provided, wherein:
 - if the event reporting is threshold based (i.e. the "tgtNsThreshold" was provided within the MonitoringEventSubscription data type), the "nSStatusInfo" attribute shall contain a confirmation for reaching the targeted threshold value, i.e. by sending the current number of registered UEs or the current number of established PDU Sessions, for the network slice identified by the "snssai" attribute provided during the subscription creation/update;
 - if the event reporting is periodical (i.e. the "repPeriod" was provided within the MonitoringEventSubscription data type), the "nSStatusInfo" attribute shall provide the current network slice status information, i.e. the current number of registered UEs or the current number of established PDU Sessions for the network slice identified by the "snssai" attribute provided during the subscription creation/update; and

NOTE 4: The handling of threshold based notifications is described in subclause 4.15.3.2.10 of 3GPP TS 23.502 [2].

NOTE 5: If the NEF interacts with multiple NSACFs for the requested S-NSSAI, the NEF performs the aggregation of the received network slice status reports from all these NSACFs and determines based on that whether a notification towards the subscribing AF needs to be sent or not (i.e. the reporting conditions to trigger a notification towards the AF are fulfilled or not).

- in order to unsubscribe from network slice status reporting, the AF shall send an HTTP DELETE message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in subclause 5.3.3.3.3.5 of 3GPP TS 29.122 [4] to delete an existing network slice reporting subscription. Then the NEF shall interact with the NSACF to delete the associated subscription to notifications by invoking the Nnsacf_SliceEventExposure_Unsubscribe service operation as specified in 3GPP TS 29.536 [47].

4.4.3 Procedures for Device Triggering

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

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

4.4.4 Procedures for resource management of Background Data Transfer

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

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- If the feature Group_Id is supported, an external group identifier may be included in the HTTP POST or PUT request message by the NEF. If the external group Id is sent from the AF to the NEF, the NEF shall interact with the UDM by using Nudm_SubscriberDataManagement service as defined in 3GPP TS 29.503 [17] to translate the external group identifier into the corresponding internal group identifier;
- description of the PCRF applies to the PCF;

- the NEF shall interact with the PCF by using Npcf_BDTPolicyControl service as defined in 3GPP TS 29.554 [19];
- if the "BdtNotification_5G" feature is supported, the AF may include a notification URI within the "notificationDestination" attribute in the Bdt data type during the background data transfer policy negotiation. In addition, the AF may request to enable the BDT warning notification by setting the "warnNotifEnabled" attribute to true. When the NEF receives the BDT warning notification from the PCF as defined in clause 4.2.4.2 of 3GPP TS 29.554 [19] and the "warnNotifEnabled" attribute was set to true, the NEF shall send an HTTP POST message including the ExNotification data structure to the AF identified by the notification destination URI received during the background data transfer policy negotiation. The AF shall respond with an HTTP response to confirm the received notification. The AF may select one policy from the candidate of BDT policies if provided in the notification by using the HTTP PATCH message as described in subclause 5.4.3.3.3 of 3GPP TS 29.122 [4]. If the selected policy is set to value "0" within the "selectedPolicy" attribute in the HTTP PATCH message, it implies no transfer policy is selected by the AF. The AF may also request to disable/enable the BDT warning notification by including the "warnNotifEnabled" attribute in the HTTP PATCH message; and
- The AF may include a traffic descriptor of background data within the "trafficDes" attribute in the Bdt data type during the background data transfer policy negotiation.

4.4.5 Procedures for CP Parameters Provisioning

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

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- description of the HSS applies to the UDM;
- the NEF shall interact with the UDM by using Nudm_ParameterProvision service as defined in 3GPP TS 29.503 [17]; and
- if the ExpectedUMT_5G feature as defined in subclause 5.10.4 of 3GPP TS 29.122 [4] is supported, the expected UE moving trajectory within the "expectedUmts" attribute shall also be included in the HTTP POST/PUT request. In addition, if the ExpectedUmtTime_5G feature as defined in subclause 5.10.4 of 3GPP TS 29.122 [4] is supported, the start time and duration may be provided in the "expectedUmts" attribute to indicate when the UE arrives at a location and how long the UE stays in the location and the periodicity in the "expectedUmtDays" attribute may be provided to indicate the effective days within a week.

4.4.6 Procedures for PFD Management

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

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

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

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

4.4.7 Procedures for Traffic Influence

4.4.7.1 General

In order to create a resource for the Traffic Influence, the AF shall send an HTTP POST message to the NEF to the resource "Traffic Influence Subscription", the body of the HTTP POST message may include the AF Service Identifier, external Group Identifier, any UE Indication, the UE address, GPSI, DNN, S-NSSAI, Application Identifier or traffic filtering information, Subscribed Event, Notification destination address, a list of geographic areas(s), AF Transaction Identifier, a list of DNAI(s), routing profile ID(s) or N6 traffic routing information, Indication of application relocation possibility, type of notifications, Temporal validity conditions, and if the URLLC feature is supported, Indication of AF acknowledgement to be expected and/or Indication of UE IP address preservation. If the AF_latency feature is supported, user plane latency requirements may also be included and may support the indication of simultaneous connectivity in the "simConnInd" attribute and the minimum time interval for inactivity of traffic via source PSA in the "simConnTerm" attribute. If the EASDiscovery feature is supported, the indication of the EAS rediscovery may also be included. If the EASIPreplacement feature is supported, EAS IP replacement information may also be included. The Notification destination address shall be included if the Subscribed Event is included in the HTTP request message.

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

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

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

NOTE: The EAS IP Replacement information and the information indicating the EAS rediscovery are not provided simultaneously.

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 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 respond to the AF with a 200 OK status code with the "TrafficInfluSub" data structure as response body containing the representation of the modified "Individual Traffic Influence Subscription", or an HTTP "204 No Content" response.
- 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 respond 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 with the "TrafficInfluSub" data structure as response body containing the representation of the modified "Individual Traffic Influence Subscription", or an HTTP "204 No Content" response.
- 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 set to "SUCCESS" and may provide within the AfResultInfo data the N6 traffic routing information associated to the target DNAI as "trafficRoute" attribute and, if the "ULBuffering" feature is supported, an indication that buffering of uplink traffic to the target DNAI is needed as "upBuffInd" attribute and, if the "EASIPreplacement" feature is supported, EAS IP replacement information as "easIpReplaceInfos" attribute; 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;
- in the HTTP POST request, the AF may include the AF session subscribed "dnn" attribute and/or "snssai" attribute;
- 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, If the AppId feature is not supported, the AF shall include the Ethernet Flow description within the "ethFlowInfo" attribute instead of the IP Flow description; otherwise, the AF shall include either the External Application Identifier within the "exterAppId" attribute or the Ethernet Flow description within the "ethFlowInfo" attribute;
 - in the HTTP PATCH request, the AF may update the Ethernet Flow description within the "ethFlowInfo" attribute or the External Application Identifier within the "exterAppId" 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];
- in the HTTP POST request, the AF may include a "dnn" attribute and/or a "snssai" attribute; and in the HTTP PUT request, the AF shall keep the same value(s) of the "dnn" attribute and/or the "snssai" attribute as set in the HTTP POST request if provided;
- description about the INDICATION_OF_SUCCESSFUL_RESOURCES_ALLOCATION event and INDICATION_OF_FAILED_RESOURCES_ALLOCATION event apply to the SUCCESSFUL_RESOURCES_ALLOCATION event and FAILED_RESOURCES_ALLOCATION event respectively; In addition, description about the INDICATION_OF_RELEASE_OF_BEARER, INDICATION_OF_LOSS_OF_BEARER and INDICATION_OF_RECOVERY_OF_BEARER events are not applicable in this specification.
- 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. If the AppId feature is not supported, the AF shall include the Ethernet Flow description within the "ethFlowInfo" attribute instead of the IP Flow description; otherwise, the AF shall include either the External Application Identifier within the "exterAppId" attribute or the Ethernet Flow description within the "ethFlowInfo" attribute;

- in the HTTP PATCH request, the AF may update the Ethernet Flow description within the "ethFlowInfo" attribute or the External Application Identifier within the "exterAppId" attribute;
- if the "QoSMonitoring_5G" feature as defined in subclause 5.14.4 of 3GPP TS 29.122 [4] is supported, in order to support the QoS Monitoring, the AF shall include "qosMonInfo" attribute. The AF shall also include the "directNotifInd" attribute set to true if the "ExposureToEAS" feature is supported and the direct notification is required. 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 "repThreshDI" attribute;
 - the delay threshold for uplink with the "repThreshUI" attribute; and/or
 - the delay threshold for round trip with the "repThreshRp" attribute; and
 - the minimum waiting time between subsequent reports within the "waitTime" attribute.
 - when the NEF receives the event notification as defined in subclause 4.2.2 of 3GPP TS 29.508 [26] or subclauses 4.2.4.12 and 4.2.5.14 of 3GPP TS 29.514 [7], the NEF shall include one or more QoS monitoring reports within the "qosMonReports" attribute. Within the QosMonitoringReport data structure, the NEF shall include:
 - 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 and, if the "DisableUENotification_5G" feature is also supported, an indication that the UE does not need to be informed about changes related to Alternative QoS Profiles within the "disUeNotif" attribute. The NEF shall transfer them to the PCF in the Npcf_PolicyAuthorization service and subscribe to PCF event "QOS_NOTIF" in the Npcf_PolicyAuthorization service. When the NEF receives the notification of PCF event "QOS_NOTIF", it shall notify the AF with "QOS_GUARANTEED" event; or "QOS_NOT_GUARANTEED" event with the currently applied QoS reference if received. When the NEF receives the notification of PCF event "SUCCESSFUL_RESOURCES_ALLOCATION", it shall notify the AF the event together with the currently applied QoS reference if received.

NOTE 1: 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.

- if the "TSC_5G" feature is supported, the AF may include:
 - the TSC QoS requirement within the "tscQosReq" attribute. Within the TscQosRequirement data structure, the AF shall include:
 - requested GBR within the "reqGbrDI" attribute and/or "reqGbrUI" attribute;
 - requested MBR within the "reqMbrDI" attribute and/or "reqMbrUI" attribute; and
 - the TSCAI input information within the "tscAIInputUI" attribute and/or "tscAIInputDI" attribute;

and may include:

- the maximum burst size within the "maxTscBurstSize" attribute;
- the priority within the "priority" attribute;

- the requested 5GS delay within the "req5Gsdelay" attribute; and
- the TSCAI time domain within the "tscaiTimeDom" attribute.
- if the "AltQosWithIndParams_5G" feature is supported, the AF may include:
 - alternative service requirements that include individual QoS parameter sets within the "altQosReqs" attribute. Within the AlternativeServiceRequirementsData data structure, the AF shall include:
 - a reference to the alternative individual QoS related parameter(s) included in this set within the "altQosParamSetRef" attribute; and
 - at least one of the following:
 - The guaranteed bandwidth in uplink within the "gbrUI" attribute and the guaranteed bandwidth in downlink within the "gbrDI" attribute;
 - The packet delay budget within the "packetDelayBudget" attribute;

If the NEF authorizes the AF request, the NEF shall provision the received QoS requirement to the TSCTSF by invoking the Ntsctsf_QoSandTSCAssistance_Create request as defined in 3GPP TS 29.565 [50].

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 NiddConfiguarationTrigger data type with:

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

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

4.4.12.3 NIDD configuration triggered by the AF and NIDD delivery

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

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

4.4.13 Procedures for RACS Parameter Provisioning

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

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

4.4.14 Procedures for analytics information exposure

4.4.14.1 Subscription/unsubscription to notification of analytics information

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

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

The AnalyticsExposureSubsc data structure shall include:

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

The AnalyticsExposureSubsc data structure may include:

- event reporting requirement information as "analyRepInfo" attribute, which applies for all events in a subscription and may contain the following attributes:
 - 1) event notification method (periodic, one time, on event detection) as "notifMethod" attribute;
 - 2) maximum Number of Reports as "maxReportNbr" attribute;
 - 3) monitoring Duration as "monDur" attribute;
 - 4) repetition period for periodic reporting as "repPeriod" attribute;
 - 5) immediate reporting indication as "immRep" attribute;
 - 6) sampling ratio as "sampRatio" attribute;
 - 7) group reporting guard time as "grpRepTime" attribute.

Each AnalyticsEventSubsc data structure may include:

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

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 NnwdafeventsSubscription 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. If not all the requested analytics events in the subscription are accepted, then the NEF may include the "failEventReports" attribute indicating the event(s) for which the subscription failed and the associated reason(s).
- for the HTTP PUT request, update a resource "Individual Analytics Exposure Subscription" which represents the analytics exposure subscription, and shall respond to the AF with a 200 OK or 204 No Content status code. When responding with a 200 OK status code, if not all the requested analytics events in the subscription are modified successfully, then the NEF may include the "failEventReports" attribute indicating the event(s) for which the modification failed and the associated reason(s).
- for the HTTP DELETE request, remove all properties of the resource and delete the corresponding active resource "Individual Analytics Exposure Subscription" which represents the analytics exposure subscription, then shall respond to the AF with a 204 No Content status code.

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

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

4.4.14.2 Fetch analytics information

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

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

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

and may include:

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

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

4.4.15 Procedures for 5G LAN Parameter Provisioning

4.4.15.1 General

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

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

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

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

Upon receipt of the corresponding HTTP POST message, if the AF is authorized by the NEF to provision the parameters, the NEF shall interact with the UDM to create a subscription at the UDM by using Nudm_ParameterProvision service as defined in 3GPP TS 29.503 [17]. If the request is accepted by the UDM and the UDM informs the NEF with a successful response, the NEF shall create a new subscription and assign a subscription identifier for the "Individual 5GLAN Parameters Provision Subscription" resource. Then the NEF shall send a HTTP

"201 Created" response with 5GLanParametersProvision data structure as response body and a Location header field containing the URI of the created individual subscription resource.

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

To modify an existing subscription to provision 5G LAN parameters, the AF shall initiate an HTTP PUT/PATCH request to the NEF for the "Individual 5GLAN Parameters Provision Subscription" resource. The body of the HTTP PUT message shall include the 5GLanParametersProvision data type as defined in subclause 5.7.2.3.2. The External Group Identifier, DNN, S-NSSAI and PDU session type(s) 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 Subscription" resource. Then the NEF shall send a HTTP response including "200 OK" status code with 5GLanParametersProvision data structure or "204 No Content" status code.

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

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

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

4.4.16 Procedures for applying BDT policy

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

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

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

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

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

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

- for the HTTP POST request, create a resource "Individual Applied BDT Policy Subscription" addressed by a URI that contains the AF Identifier and an NEF-created subscription identifier, and shall respond to the AF with a "201 Created" status code, including a Location header field containing the URI of the created resource. The AF shall use the URI received in the Location header in subsequent requests to the NEF to refer to this resource.
- for the HTTP PATCH request, update a resource "Individual Applied BDT Policy Subscription" which represents the applied BDT policy subscription, and shall respond to the AF with a "200 OK" or "204 No Content" status code.

- for the HTTP DELETE request, delete the corresponding active resource "Individual Applied BDT Policy Subscription", and shall respond to the AF with a "204 No Content" status code.

4.4.17 Procedures for Enhanced Coverage Restriction Control

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

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- description of the HSS applies to the UDM; and
- upon receipt of HTTP POST request from the AF to query the current status of enhanced coverage restriction, the NEF shall interact with the UDM by using the Nudm_SubscriberDataManagement service as specified in 3GPP TS 29.503 [17].
- upon receipt of HTTP POST request from the AF to configure the enhanced coverage restriction, the NEF shall interact with the UDM by using the Nudm_ParameterProvision service as specified in 3GPP TS 29.503 [17].
- if the ECR_WB_5G feature is supported, in order to configure the enhanced coverage restriction for WB UE, the HTTP POST request message shall include the WB mode related enhanced coverage restriction information via the "ecrDataWbs" attribute for the WB UE.

4.4.18 Procedures for IPTV Configuration

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

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

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

and may include:

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

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

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

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

Upon receipt of the HTTP request from the AF, if the AF is authorized, the NEF shall interact with the UDM by invoking the Nudm_SubscriberDataManagement service as described in 3GPP TS 29.503 [17] to retrieve the SUPI or

Internal Group Identifier. Then the NEF shall interact with the UDR to create, update or delete the IPTV configuration by using the `Nudr_DataRepository` service as defined in 3GPP TS 29.519 [23]. If the NEF receives an error code from the UDR, the NEF shall not create, update or delete the resource and shall respond to the AF with a proper error status code.

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

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

4.4.19 Procedures for Location Privacy Indication Parameters Provisioning

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

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

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

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

If the "PatchUpdate" feature defined in subclause 5.10.3 is supported, in order to partially modify an existing LPI Parameters Provisioning resource, the AF may send an HTTP PATCH request message to the NEF on the "Individual LPI Parameters Provisioning" resource, with the request body containing the `LpiParametersProvisionPatch` data structure including only the attributes that shall be updated.

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

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

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

4.4.20 Procedures for service specific parameter provisioning

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

In order to provision service specific parameters to the 5G system, the AF shall send an HTTP POST message to the NEF targeting the resource "Service Parameter Subscriptions", the HTTP POST message shall include the ServiceParameterData data structure as request body. The ServiceParameterData data structure shall include:

- service description via:
 - a) a combination of DNN and S-NSSAI within the "dnn" attribute and the "snssai" attribute respectively;
 - b) an AF service identifier within the "afServiceId" attribute; or
 - c) an application identifier within the "appId" attribute;

NOTE: When the feature "AfGuideURSP" is supported, only the "afServiceId" attribute needs to be included for providing guidance for URSP determination.

- 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) a MAC address of the UE within the "ueMac" attribute;
 - e) an identification of a group of UE(s) within the "exterGroupId" attribute; or
 - f) an identification of any UE within the "anyUeInd" attribute.
- service parameters for at least one of the following:
 - V2X service parameters via:
 - a) configuration parameters for V2X communications over PC5 within the "paramOverPc5" attribute;
 - b) configuration parameters for V2X communications over Uu within the "paramOverUu" attribute;
 - if the "ProSe" feature is supported, 5G ProSe service parameters via:
 - a) configuration parameters for 5G ProSe direct discovery within the "paramForProSeDd" attribute;
 - b) configuration parameters for 5G ProSe direct communication within the "paramForProSeDc" attribute;
 - c) configuration parameters for 5G ProSe UE-to-network relay, including configuration parameters for 5G ProSe UE-to-network relay UE within the "paramForProSeU2NRelUe" attribute and configuration parameters for 5G ProSe remote UE within the "ParamForProSeRemUe" attribute;
 - If the "AfGuideURSP" feature is supported, URSP service parameters via:
 - a) contents for the AF guidance on URSP within the "urspGuidance" attribute, which shall include one or more URSP rule requests. Each URSP rule request may include a traffic descriptor within the "trafficDesc" attribute and one or more route selection parameter sets within the "routeSelParamSets" attribute. Each route selection parameter set may include a precedence value within the "precedence" attribute, a DNN within the "dnn" attribute, an S-NSSAI within the "snssai" attribute, and a spatial validity condition within the "spatialValidity" attribute. If the request contains only one route selection parameter set, each of the optional attributes "dnn", "snssai", "precedence", and "spatialValidity" that is missing from the request may be complemented by the NEF based on local configuration for the provided AF service identifier. It is up to the NEF to transform the information of the "spatialValidity" attribute into a list of TAIs..

and may include:

- If the "AfNotifications" feature is supported,
 - a) subscription to event notification of the outcome related to invocation of service parameter provisioning within the "subNotifEvents" attribute; and

- b) notification URI within the "notificationDestination" attribute.

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

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

Upon receipt of the HTTP request from the AF, and 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. NEF may, based on local configuration, complement missing service parameters. Additionally, based on operator's local policy, NEF may support service specific authorization as described in subclause 4.15.6.10 in 3GPP TS 23.502 [2]. Then the NEF shall interact with the UDR to create, update or delete the associated service parameters by using the Nudr_DataRepository service as defined in 3GPP TS 29.519 [23]. If information related to AfNotifications feature are received from the AF, the NEF shall also include the required information (e.g. "policDelivNotifUri" and "policDelivNotifCorreId" attributes in 3GPP TS 29.519 [23]) in UDR data creation if the NEF supports the DeliveryOutcome feature (as described in 3GPP TS 29.504 [4]). 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 an HTTP POST request, create an "Individual Service Parameter Subscription" resource which represents the Service Parameter provisioning request, addressed by a URI that contains the AF Identifier and a 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 an HTTP PUT or HTTP PATCH request, update the "Individual Service Parameter Subscription" resource which represents the service parameter provisioning request, and respond to the AF with a 200 OK or 204 No Content status code.
- for an HTTP DELETE request, remove all properties of the resource and delete the corresponding active "Individual Service Parameter Subscription" resource, then respond to the AF with a 204 No Content status code.

When the NEF receives the Service Specific Authorization Update information from the UDM by Nudm_ServiceSpecificAuthorization_UpdateNotify service operation defined in 3GPP TS 29.503 [17], if the authorization is revoked, the NEF shall provide a notification to AF by sending HTTP POST message that include the AfNotification data structure. Upon receipt of the notification, the AF shall respond with a "204 No Content" status code to confirm the received notification.

When the NEF receives the notification of the outcome of invocation related to AF provisioned service parameters from the PCF by Npcf_EventExposure_Notify service operation defined in 3GPP TS 29.523 [22], the NEF shall **determine the corresponding service parameter subscription** and provide a notification to AF by sending HTTP POST message that include the AfNotification data structure. Upon receipt of the notification, the AF shall respond with a "204 No Content" status code to confirm the received notification.

4.4.21 Procedures for ACS configuration parameter provisioning

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

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

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

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

If the "PatchUpdate" feature defined in subclause 5.12.3 is supported, in order to partially modify an existing ACS Configuration subscription, the AF shall send an HTTP PATCH request message to the NEF on the "Individual ACS Configuration Subscription" resource, with the request body containing the AcsConfigurationDataPatch data structure including only the attributes that shall be modified.

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/PATCH request, update/modify the concerned "Individual ACS Configuration Subscription" resource which represents the ACS configuration, and shall responds to the AF with an HTTP "200 OK" or an HTTP "204 No Content" status code.
- for the HTTP DELETE request, remove all properties of the resource and delete the corresponding active resource "Individual ACS Configuration Subscription", then shall responds to the AF with a 204 No Content status code.

4.4.22 Procedures for Mobile Originated Location Request

4.4.22.1 General

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

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

4.4.22.2 Location Update Notification triggered by UE

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

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

4.4.23 Procedures for AKMA

4.4.23.1 General

The procedures support:

- request AKMA application key by the AF to the AAnF via the NEF as described in subclause 6.3 of 3GPP TS 33.535 [37];

4.4.23.2 AKMA Application Key Request

In order to retrieve the AKMA application key, the AF shall send an HTTP POST request message to the resource URI "{apiRoot}/3gpp-akma/v1/retrieve". The HTTP POST request includes the identification of AF and an A-KID.

Upon receipt of the corresponding HTTP POST message from the AF, if the AF's request is authorized by the NEF, then the NEF shall interact with the AAnF to retrieve the AKMA application key by using Naanf_AKMA service as defined in 3GPP TS 29.535 [38]. After receiving a successful response from the AAnF, the NEF shall respond to the AF with a 200 OK status code, including a K_{AF} and the expiration time of the K_{AF} and optionally the GPSI (external ID) which may be translated from the SUPI received from the AAnF. If the NEF receives an error code from the AAnF, the NEF shall respond to the AF with a proper error status code.

If the NEF receives a response from the AAnF with an HTTP "403 Forbidden" status code and the response message body including a ProblemDetails data structure with the "cause" attribute set to the "K_AKMA_NOT_PRESENT" application error, then the NEF shall relay this response to the AF.

4.4.24 Procedures for Time Synchronization Exposure

4.4.24.0 General

Time synchronization exposure allows an AF to configure time synchronization in 5GS. Depending on the time distribution method to use for the service (e.g. (g)PTP or 5G access stratum time distribution), the AF may require retrieving 5GS time synchronization capabilities prior to sending the time synchronization service request as described in subclause 4.4.24.1. For (g)PTP operation, the Time synchronization service allows an AF to subscribe to the UE availability for time synchronization service and to configure the (g)PTP instance in 5GS as described in subclause 4.4.24.2. For 5G access stratum based time distribution, the AF can influence the 5G access stratum time distribution as described in subclause 4.4.24.3. The time synchronization exposure is provided by NEF that uses the service provided by TSCTSF. The AF that is part of operator's trust domain may invoke the services directly with TSCTSF.

NOTE: The AF can use either the procedure for configuring the (g)PTP instance in 5GS as described in clause 4.4.24.2 or the procedure for controlling the 5G access stratum time distribution as described in clause 4.4.24.3 for a particular UE. The procedures are not intended to be used in conjunction.

4.4.24.1 Subscription to notification of Time Synchronization Capabilities

The procedures are used by the AF to subscribe to notifications and to explicitly cancel a previous subscription for UE availability for the time synchronization service via the NEF.

In order to subscribe to the notification for UE availability for the time synchronization service, the AF shall send an HTTP POST message to the NEF to the customized operation URI "{apiRoot}/3gpp-time-sync/v1/{afId}/subscriptions". The HTTP POST message shall include the TimeSyncExposureSubsc data structure as request body. The TimeSyncExposureSubsc data structure shall include:

- one of the indication of the UEs to which the time synchronization capabilities is requested via:
 - identification of a list of individual UEs within a "gpsis" attribute;
 - indication of any UE within the "anyUeInd" attribute if DNN and S-NSSAI are provisioned; or
 - identification of a group of UE(s) via a "exterGroupId" attribute.
- subscription to event(s) notification as "evSubsc" attribute;
- notification URI within the "subsNotifUri" attribute;
- notification correlation Id within the "subsNotifId" attribute;

and may include:

- either the DNN within the "dnn" attribute and the "snssai" attribute or the AF Service Identifier within the "afServiceId" attribute;
- the requested event filter(s) within the "eventFilters" attribute;
- notification methods within the "notifMethods" attribute
- maximum number of reports within the "maxReportNbr" attribute;
- expiry time within the "expiry" attribute; and
- report period within the "repPeriod" attribute.

In order to delete an existing subscription, the AF shall send an HTTP DELETE message to the NEF targeting the resource "Individual Time Synchronization Exposure Subscription".

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. Then the NEF shall select a TSCTSF based on the local configuration or attempt to retrieve the TSCTSF from the UDR as defined in 3GPP TS 29.519 [23] if the NEF has not obtained the TSCTSF for the given DNN and S-NSSAI combination. If the NEF does not retrieve the TSCTSF from the UDR, the NEF shall select a TSCTSF from the NRF as defined in 3GPP TS 29.510 [x] and then store the selected TSCTSF in the UDR as defined in 3GPP TS 29.519 [23]. After the NEF obtains TSCTSF, the NEF shall invoke the Ntsctsf_TimeSynchronization_CapsSubscribe request service operation to the selected TSCTSF. If the NEF receives an error code from the TSCTSF, the NEF shall not create or delete the resource and shall respond to the AF with a proper error status code.

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

- for an HTTP POST request, create an "Individual Time Synchronization Exposure Subscription" resource which represents the time synchronization exposure subscription request, addressed by a URI that contains the AF Identifier and a 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 Time Synchronization Exposure Subscription.
- when the NEF receives the notification of the time synchronization capability for a list of UE(s) from the TSCTSF by Ntsctsf_TimeSynchronization_CapsNotify service operation defined in 3GPP TS 29.565 [50], the NEF shall provide a notification to AF by sending HTTP POST message that include the TimeSyncExposureSubsNotif data structure in the request body. Upon receipt of the notification, the AF shall respond with a "204 No Content" status code to confirm the received notification.
- for an HTTP DELETE request, remove all properties of the resource and delete the corresponding active "Individual Time Synchronization Exposure Subscription" resource, then respond to the AF with a 204 No Content status code.

4.4.24.2 Time Synchronization Exposure Configuration

The procedures are used by the AF to activate, modify or deactivate the (g)PTP instances by performing the time synchronization configuration at the NEF.

In order to configure the time synchronization parameters, the AF shall initiate an HTTP POST request to the NEF for the "Time Synchronization Exposure Configurations" resource. The body of the HTTP POST message shall include the Time Synchronization related parameters within the TimeSyncExposureConfig data structure.

Upon receipt of the corresponding HTTP POST message and the request is authorized by the NEF, the NEF invokes the Ntsctsf_TimeSynchronization_ConfigCreate service operation with the corresponding TSCTSF as defined in 3GPP TS 29.565 [50]. After receiving a successful response from the TSCTSF, the NEF shall create a new resource and assign an identifier for the "Individual Time Synchronization Exposure Configuration" resource. Then the NEF shall send a HTTP "201 Created" response with TimeSyncExposureConfig 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 Time Synchronization Exposure Configuration, the AF may send an HTTP PUT message to the resource "Individual Time Synchronization Exposure Configuration" requesting the NEF to change

all properties in the existing resource. The body of the HTTP PUT request message shall include TimeSyncExposureConfig data type as defined in subclause 5.15.4.3.6. The user plane node Id shall remain unchanged from previous values.

Upon receipt of the corresponding HTTP PUT message and the request is authorized by the NEF, the NEF shall interact with the TSCTSF to modify an existing resource at the TSCTSF by using Ntsctsf_TimeSynchronization_ConfigUpdate service operation as defined in 3GPP TS 29.565 [50]. If the modification request is accepted by the TSCTSF and the TSCTSF informs the NEF with a successful response, the NEF shall update the existing resource for the "Individual Time Synchronization Exposure Configuration" resource. Then the NEF shall send a HTTP response including "200 OK" status code with TimeSyncExposureConfig data structure or "204 No Content" status code.

When the NEF receives the notification of the current state of time synchronization service configuration from the TSCTSF by Ntsctsf_TimeSynchronization_ConfigUpdateNotify service operation defined in 3GPP TS 29.565 [50], the NEF shall provide a notification to AF by sending HTTP POST message that include the TimeSyncExposureConfigNotif data structure in the request body. Upon receipt of the notification, the AF shall respond with a "204 No Content" status code to confirm the received notification.

To delete an existing "Individual Time Synchronization Exposure Configuration", the AF shall initiate an HTTP DELETE request to the NEF for the "Individual Time Synchronization Exposure Subscription" resource.

Upon receipt of the corresponding HTTP DELETE message, if the AF is authorized, the NEF shall interact with the TSCTSF to delete an existing Individual Time Synchronization Exposure Configuration at the TSCTSF by using Ntsctsf_TimeSynchronization_ConfigDelete service operation as defined in 3GPP TS 29.565 [50]. If the request is accepted by the TSCTSF, the NEF shall delete the existing resource for the "Individual Time Synchronization Exposure Configuration" resource. Then the NEF shall send a HTTP "204 No Content" response.

4.4.24.3 Management of 5G access stratum time distribution

The procedures are used by the AF to activate, update or delete the 5G access stratum time distribution for one UE, group of UEs or any UE using the DNN and S-NSSAI.

In order to configure the 5G access stratum time distribution parameters, the AF shall initiate an HTTP POST request to the NEF for the "ASTI Configurations" resource. The body of the HTTP POST message shall include the 5G access stratum time distribution parameters within the AccessTimeDistributionData data structure.

Upon receipt of the corresponding HTTP POST message and the request is authorized by the NEF, the NEF invokes the Ntsctsf_TimeSynchronization_ASTICreate service operation with the corresponding TSCTSF as defined in 3GPP TS 29.565 [50]. After receiving a successful response from the TSCTSF, the NEF shall create a new resource and assign an identifier for the "Individual ASTI Configuration" resource. Then the NEF shall send a HTTP "201 Created" response with AccessTimeDistributionData 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 ASTI Configuration, the AF may send an HTTP PUT message to the resource "Individual ASTI Configuration" requesting the NEF to change all properties in the existing resource. The body of the HTTP PUT request message shall include AccessTimeDistributionData data type as defined in subclause 5.15.4.3.13.

Upon receipt of the corresponding HTTP PUT message and the request is authorized by the NEF, the NEF shall interact with the TSCTSF to modify an existing resource at the TSCTSF by using Ntsctsf_TimeSynchronization_ASTIUpdate service operation as defined in 3GPP TS 29.565 [50]. If the modification request is accepted by the TSCTSF and the TSCTSF informs the NEF with a successful response, the NEF shall update the existing resource for the "Individual ASTI Configuration" resource. Then the NEF shall send a HTTP response including "200 OK" status code with AccessTimeDistributionData data structure or "204 No Content" status code.

To delete an existing Individual ASTI Configuration, the AF shall initiate an HTTP DELETE request to the NEF for the "Individual ASTI Configuration" resource.

Upon receipt of the corresponding HTTP DELETE message, if the AF is authorized, the NEF shall interact with the TSCTSF to delete an existing Individual Time Synchronization Exposure Configuration at the TSCTSF by using Ntsctsf_TimeSynchronization_ASTIDelete service operation as defined in 3GPP TS 29.565 [50]. If the request is accepted by the TSCTSF, the NEF shall delete the existing resource for the "Individual ASTI Configuration" resource. Then the NEF shall send a HTTP "204 No Content" response.

AF may request and query the status of the access stratum time distribution sending the HTTP POST to the resource "ASTI Configuration Retrieve". The body of the HTTP POST request message shall include StatusRequestData data type as defined in subclause 5.15.4.3.14.

Upon receipt of the corresponding HTTP POST message, if the AF is authorized, the NEF shall interact with the TSCTSF by using Ntsctsf_TimeSynchronization_ASTIGet service operation as defined in 3GPP TS 29.565 [50]. Upon receipt of response from the TSCTSF, the NEF shall send a HTTP "200 OK" response with the StatusResponseData data structure as defined in subclause 5.15.4.3.15 in the payload.

Editor's Note: Error and redirection responses are FFS.

4.4.25 Procedures for ECS address Provisioning

The procedures are used by the AF to provision ECS address(es) to the NEF. The procedures are applicable for an individual UE or a group of UEs.

In order to create an Individual ECS Address Provision Configuration resource, the AF shall initiate an HTTP POST request to the NEF for the "ECS Address Provision Configurations" resource. The body of the HTTP POST message shall include within the EcsAddressProvision data structure the ECS address(es) via the "ecsServerAddr" attribute, may include the spatial validity condition via the "spatialValidityCond" attribute and target of UE information via the "tgtUe" attribute. Upon receipt of the corresponding HTTP POST message, if the AF is authorized by the NEF to provision the ECS address(es), 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 ECS Address Provision Configuration" resource. Then the NEF shall send a HTTP "201 Created" response with EcsAddressProvision 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 ECS Address Provision Configuration, the AF shall send an HTTP PUT message to the resource "Individual ECS Address Provision Configuration" requesting the NEF to change all properties in the existing resource. The body of the HTTP PUT request message shall include the EcsAddressProvision data type. Upon receipt of the corresponding HTTP PUT message, if the AF is authorized by the NEF to provision the ECS address(es), 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 ECS Address Provision Configuration" resource. Then the NEF shall send a HTTP response including "200 OK" status code with EcsAddressProvision data structure or "204 No Content" status code.

To delete an existing Individual ECS Address Provision Configuration, the AF shall initiate an HTTP DELETE request to the NEF for the "Individual ECS Address Provision Configuration" resource. Upon receipt of the corresponding HTTP DELETE message, if the AF is authorized, the NEF shall interact with the UDM to delete the existing 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, the NEF shall delete the existing resource for the "Individual ECS Address Provision Configuration" resource. Then the NEF shall send a HTTP "204 No Content" response.

4.4.26 Procedures for AM Policy Authorization

4.4.26.1 General

The procedures are used by AF to send request to NEF for AM Policy Authorization, and for NEF to authorize an AF triggered AM Policy Authorization request and trigger a respective Npcf_AMPolicyAuthorization request. This service also allows the AF to subscribe/unsubscribe the notification of event(s) for the existing AF application AM context.

The following procedures support:

- Create/Modify/Delete of AF triggered application AM context; and
- Subscribe/Unsubscribe/Notify event(s) for the existing AF application AM context.

4.4.26.2 Creation of a new Individual Application AM Context

In order to create a new subscription of a new Individual application AM context resource for a given AF, the AF shall initiate an HTTP POST request to the NEF for the "Application AM Contexts" resource. The HTTP POST message shall include AppAmContextExpData data structure as request body. The AppAmContextExpData data structure shall include:

- identification of an individual UE via a "gpsi" attribute;

and may include:

- subscription to AM policy event(s) notification as "evSubscs" attribute. For each subscribed event, the AF may include the description of the event reporting mode, as e.g. whether immediate reporting is required;
- a high throughput requirement Indication as "highThruInd" attribute;
- service coverage requirements as "covReqs" attribute;
- policy duration requirement as "policyDuration" attribute.

Upon receipt of the corresponding HTTP POST message, if the AF is authorized by the NEF to request the AM policy authorization, the NEF shall trigger a respective Npcf_AMPolicyAuthorization_Create request as defined in 3GPP TS 29.534 [43]. If the request is accepted by the PCF and the PCF informs the NEF with a successful response, the NEF shall create a new subscription and assign a subscription identifier for the "Individual application AM Context" resource.

Then the NEF shall send a HTTP "201 Created" response with:

- AppAmContextExpRespData data structure as response body, including the created "Individual application AM Context" resource and, if immediate reporting was requested for the subscribed event(s), the currently available value(s), if received from the PCF; and
- a Location header field containing the URI of the created individual subscription resource to the AF.

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

4.4.26.3 Modification of an existing individual Application AM Context

In order to modify an existing individual Application AM Context resource, the AF shall initiate an HTTP PATCH request to the NEF for the "Individual application AM Context" resource. The body of the HTTP PATCH message shall include the AppAmContextExpUpdateData data type as defined in subclause 5.17.1.3.3.3.

Upon receipt of the corresponding HTTP PATCH message, if the AF is authorized by the NEF to modify the AM policy authorization request, the NEF shall interact with the PCF to modify an existing application AM context by using Npcf_AMPolicyAuthorization_Update request as defined in 3GPP TS 29.534 [43]. If the modification request is accepted by the PCF and the PCF informs the NEF with a successful response, the NEF shall update the existing application AM context for the "Individual application AM Context" resource. Then the NEF shall send a HTTP response including "200 OK" status code with AppAmContextExpRespData data structure (including the updated resource representation and, if immediate reporting was requested for the new subscribed event(s), the currently available value(s), if received from the PCF) or "204 No Content" status code to the AF.

If the NEF receives an error code from the PCF, the NEF shall not modify the resource and shall respond to the AF with a proper error status code.

4.4.26.4 Deletion of an existing individual Application AM Context

To delete an existing application AM context, the AF shall initiate an HTTP DELETE request to the NEF for the "Individual application AM Context" resource.

Upon receipt of the corresponding HTTP DELETE message, if the AF is authorized to delete the application AM context, the NEF shall interact with the PCF to delete an existing application AM context at the PCF by using Npcf_AMPolicyAuthorization_Delete request as defined in 3GPP TS 29.534 [43]. If the request is accepted by the PCF

and informs the NEF with a successful response, the NEF shall delete the existing application AM context for the "Individual application AM Context" resource. Then the NEF shall send a HTTP "204 No Content" response to the AF.

If the NEF receives an error code from the PCF, the NEF shall take proper error handling action and shall respond to the AF with a proper error status code.

4.4.26.5 Create or modify subscription to notification of AM policy event

In order to create or modify the subscription to notification of AM policy event(s) for the application AM context, the AF shall send an HTTP PUT message to the NEF to the sub-resource "AM Policy Events Subscription", the HTTP PUT message shall include AmEventsSubscData data structure as request body.

Upon receipt of the HTTP request from the AF, if the AF is authorized, the NEF shall interact with the PCF to subscribe to, or modify the subscription to the AM policy event notification by using Npcf_AMPolicyAuthorization_Subscribe request as defined in 3GPP TS 29.534 [43]. If the request is accepted by the PCF and the PCF informs the NEF with a successful response, the NEF shall create a new AM policy event subscription sub-resource in an existing application AM context or modify an existing AM policy event subscription to the "AM Policy Events Subscription" sub-resource. Then the NEF shall send:

- for a subscription creation request, an HTTP "201 Created" response with:
 - a. AmEventsSubscRespData data structure as response body, including the created "AM Policy Events Subscription" resource and, if immediate reporting was requested for the subscribed event(s), the currently available value(s), if received from the PCF; and
 - b. a Location header field containing the URI of the created individual subscription resource to the AF; or
- for a subscription update request, an HTTP "200 OK" response code with AmEventsSubscRespData data structure with the updated "AM Policy Events Subscription" resource and, if immediate reporting was requested for the subscribed event(s), the currently available value(s), if received from the PCF;

as response body to the AF.

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

4.4.26.6 Unsubscription to notification of AM policy event

In order to delete existing subscribed AM policy event(s) within the existing Individual application AM context, the AF shall initiate the HTTP DELETE request message to the NEF to the "AM Policy Events Subscription" sub-resource.

Upon receipt of the corresponding HTTP DELETE message, if the AF is authorized to delete the notification of AM policy event(s), the NEF shall interact with the PCF to delete an existing subscription of notification to AM policy event(s) within the existing application AM context at the PCF by using Npcf_AMPolicyAuthorization_Unsubscribe request as defined in 3GPP TS 29.534 [43]. If the request is accepted by the PCF and informs the NEF with a successful response, the NEF shall delete the existing subscription to notification of AM policy event(s) within the existing application AM context for the "AM Policy Events Subscription" resource. Then the NEF shall send a HTTP "204 No Content" response to the AF.

If the NEF receives an error code from the PCF, the NEF shall take proper error handling action and shall respond to the AF with a proper error status code.

4.4.26.7 Notification of AM policy event

If the NEF receives an AM policy event notification from the PCF indicating that the subscribed AM policy event has been detected, the NEF shall provide a notification to AF by sending HTTP POST message that include the AmEventsNotification data structure in the request body. Upon receipt of the AM policy event notification, the AF shall respond with a "204 No Content" status code to confirm the received notification to the NEF.

4.4.27 Procedures for AF triggered Access and Mobility Influence

4.4.27.1 General

The procedures are used by the AF to provision the Access and Mobility(AM) policy related request via NEF to one or multiple UEs that may have already registered or not. This service also allows the NEF to send the notification of service area coverage outcome events to the AF.

4.4.27.2 Create the AM Influence Subscription

In order to create a resource for the AM Influence, the AF shall send an HTTP POST request message to the NEF for the "AM Influence Subscription" resource. The request message may include the AF Transaction Identifier, SUPI, GPSI, DNN, S-NSSAI, External Group Identifier, list of application identifier(s), AF Service Identifier, throughput requirements, service area coverage requirements represented by list of geographical areas, policy duration, subscribed event(s) and the notification destination address.

The request may target one or multiple UEs that may have already registered or not. 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. For all UEs, the NEF will not interact with the UDM.

The NEF shall interact with the UDR by invoking the Nudr_DataRepository service as described in 3GPP TS 29.504 [20] to store the policy data in the UDR.

If the NEF receives an error code from the UDR, the NEF shall not create 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 create a resource "Individual AM Influence Subscription", which represents the AM influence subscription, addressed by a URI that contains the AF Identifier and an NEF-created subscription identifier. The NEF 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 when it subsequently sends requests to the NEF to reference this AM influence subscription.

4.4.27.3 Modify the AM Influence Subscription

In order to update an existing AM influence subscription, the AF shall send an HTTP PUT or HTTP PATCH request message to the NEF for the "Individual AM Influence Subscription" resource. The NEF shall interact with the UDR by invoking the Nudr_DataRepository service as described in 3GPP TS 29.504 [20] to update the policy data in the UDR.

If the NEF receives an error code from the UDR, the NEF shall not update 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 update the "Individual AM Influence Subscription" resource which represents the AM influence subscription, and shall respond to the AF with an HTTP "200 OK" or "204 No Content" response message.

4.4.27.4 Delete the AM Influence Subscription

In order to delete an existing AM influence subscription, the AF shall send an HTTP DELETE request message to the NEF for the "Individual AM Influence Subscription" resource. The NEF shall interact with the UDR by invoking the Nudr_DataRepository service as described in 3GPP TS 29.504 [20] to delete the policy data in the UDR. If the NEF receives an error code from the UDR, the NEF shall take proper error handling actions and shall respond to the AF with a proper error status code.

After receiving a successful response from the UDR, the NEF shall delete the "Individual AM Influence Subscription" resource which represents the AM influence subscription, and shall respond to the AF with an HTTP "204 No Content" response message.

4.4.27.5 Notification of service area coverage outcome events

When the NEF receives the notification of service area coverage outcome events from the PCF as defined in 3GPP TS 29.534 [43], the NEF shall provide a notification by sending an HTTP POST message to the AF. The HTTP POST message shall include the subscribed event (service area coverage outcome event) to the AF identified by the notification destination received during the creation/modification of the AM Influence resource.

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

4.4.28 Procedures for Northbound EAS Deployment Information management

4.4.28.1 General

The procedures are used by AF to provide, update or delete EAS Deployment Information to NEF, and for NEF to authorize the AF provisioned EAS Deployment Information to be stored in the UDR.

The following procedures support:

- Create/Update/Delete the AF provisioned EAS Deployment information;

4.4.28.2 Creation of a new Individual EAS Deployment information resource

In order to create a new Individual EAS Deployment information resource for a given AF, the AF shall initiate an HTTP POST request to the NEF for the "EAS Deployment Information" resource. The HTTP POST message shall include EasDeployInfo data structure as request body. The EasDeployInfo data structure shall include:

- FQDN(s) of an application deployed in the Local part of the DN via a "fqdns" attribute;

and may include:

- an AF service identifier as the "afServiceId" attribute;
- an DNN as "dnn" attribute;
- an S-NSSAI as "snssai" attribute;
- an external Group Identifier as "exterGroupId" attribute;
- identification of an application as "appId" attribute;
- list of DNS server identifier and/or IP address(s) of the EAS in the local DN for each DNAI as "dnaInfos" attribute;

Upon receipt of the corresponding HTTP POST message, if the AF is authorized by the NEF to provide the EAS Deployment Information, the NEF shall interact with the UDR to create the associated EAS Deployment information by using the Nudr_DataRepository service as defined in 3GPP TS 29.519 [23]. If the request is accepted by the UDR and the UDR informs the NEF with a successful response, the NEF shall create a new "Individual EAS Deployment Information" resource. Then the NEF shall send a HTTP "201 Created" response with the EasDeployInfo data structure including the NEF allocated EAS Deployment Information reference as response body and a Location header field containing the URI of the created individual EAS Deployment Information resource. If the NEF receives an error code from the UDR, the NEF shall not create the resource and shall respond to the AF with a proper error status code.

Editor's note: It is FFS for the interaction between the NEF and UDR.

4.4.28.3 Modification of an existing individual EAS Deployment Information resource

In order to modify an existing individual EAS Deployment Information resource, the AF shall initiate an HTTP PUT request to the "Individual EAS Deployment Information" resource. The request body shall include the EasDeployInfo data structure. The "afServiceId" value shall remain unchanged from the previous value, if available in the HTTP PUT message.

Upon receipt of the corresponding HTTP PUT request message, if the AF is authorized by the NEF to modify the existing individual EAS Deployment Information resource, the NEF shall interact with the UDR by invoking the Nudr_DataRepository service as described in 3GPP TS 29.519 [23] to modify the EAS Deployment Information in the UDR.

If the modification request is accepted by the UDR and the UDR informs the NEF with a successful response, the NEF shall update the existing individual EAS Deployment Information resource. Then the NEF shall send a HTTP response including "200 OK" status code with EasDeployInfo data structure or "204 No Content" status code.

If the NEF receives an error code from the UDR, the NEF shall not update the "Individual EAS Deployment Information" resource and shall respond a proper error status code to the AF.

Editor's note: It is FFS for the interaction between the NEF and UDR.

4.4.28.4 Deletion of an existing individual EAS Deployment Information resource

In order to delete an existing EAS Deployment Information, the AF shall send an HTTP DELETE request message to the NEF for the "Individual EAS Deployment Information" resource. The NEF shall interact with the UDR by invoking the Nudr_DataRepository service as described in 3GPP TS 29.519 [23] to delete the EAS Deployment Information in the application data in the UDR.

After receiving a successful response from the UDR, the NEF shall delete the "Individual EAS Deployment Information" resource and shall respond to the AF with an HTTP "204 No Content" response message.

If the NEF receives an error code from the UDR, the NEF shall take proper error handling actions and shall respond to the AF with a proper error status code.

Editor's note: It is FFS for the interaction between the NEF and UDR.

4.4.29 Procedures for MBS Session Management

4.4.29.1 General

The procedures described in the subclauses below are used by an AF to interact with the 5GC for MBS session(s) management as defined in 3GPP TS 23.247 [53].

4.4.29.2 Procedures for TMGI management

4.4.29.2.1 General

The procedures described in the subclauses below are used by an AF to request and manage TMGI(s) for MBS session(s) as defined in subclause 7.1 of 3GPP TS 23.247 [53].

4.4.29.2.2 Procedure for TMGI(s) allocation or TMGI(s) expiry time refresh

This procedure is used by an AF to request the allocation of TMGI(s) for new MBS session(s) or the refresh of the expiry time of already allocated TMGI(s).

In order to request the allocation of TMGI(s) for new MBS session(s) or the refresh of the expiry time of already allocated TMGI(s), an AF shall send a Nnef_MBSTMGI_Allocation Request message to the NEF using the HTTP POST method with the request body including the TmgiAllocRequest data structure which shall contain:

- within the "afId" attribute, the identifier of the AF that is sending the request;
- within the "tmgiParams" attribute, the parameters (e.g. number of TMGI(s) to be allocated, etc.) to request the allocation of TMGI(s) for new MBS session(s) or the refresh of the expiry time of already allocated TMGI(s);

and may contain:

- within the "notificationUri" attribute, the notification URI via which the AF desires to receive notifications on timer expiry for TMGI(s);

- within the "requestTestNotification" attribute, an indication on whether the NEF should send a test notification, if the "Notification_test_event" feature is supported;
- within the "websockNotifConfig" attribute, the configuration parameters to set up notification delivery over Websocket protocol, if the "Notification_websocket" feature is supported; and/or
- within the "suppFeat" attribute, the features supported by the AF.

The NEF shall then check whether the AF is authorized to perform this operation or not as defined in subclause 6.1.1 of 3GPP TS 23.247 [53]. If the AF is authorized, the NEF may query the NRF to discover and select an MB-SMF (service) instance that can handle this request. Otherwise, the target MB-SMF is determined based on local configuration. Then, the NEF shall convey this TMGI(s) allocation or expiry time refresh request to the selected MB-SMF using the Nmbmsf_TMGI service as defined in 3GPP TS 29.532 [52].

Upon reception of a reply from the MB-SMF as defined in 3GPP TS 29.532 [52], the NEF shall forward the received information (e.g. allocated TMGI(s), expiry time or updated expiry time, etc.) in a Nnef_MBSTMGI_Allocation Response message with an HTTP "200 OK" status code to the AF. The response body shall include the TmgiAllocResponse data structure which shall contain:

- within the "tmgInfo" attribute, the TMGI(s) allocation information or the refreshed expiry time for already allocated TMGI(s);

and may contain:

- within the "suppFeat" attribute, the features supported by both the AF and the NEF.

Editor's note: Error cases and the related responses are FFS.

4.4.29.2.3 Procedure for TMGI(s) deallocation

This procedure is used by an AF to request the deallocation of previously allocated TMGI(s).

In order to request the deallocation of previously allocated TMGI(s), an AF shall send a Nnef_MBSTMGI_Deallocation Request message to the NEF using the HTTP POST method with the request body including the TmgiDeallocRequest data structure that shall contain :

- within the "afId" attribute, the identifier of the AF that is sending the request; and
- within the "tmgis" attribute, the list of TMGI(s) for which deallocation is requested.

The NEF shall then check whether the AF is authorized to perform this operation or not as defined in subclause 6.1.1 of 3GPP TS 23.247 [53]. If the AF is authorized, the NEF shall convey this TMGI(s) deallocation request to the MB-SMF using the Nmbmsf_TMGI service as defined in 3GPP TS 29.532 [52].

Upon reception of a reply from the MB-SMF confirming the deallocation of the TMGI(s), the NEF shall forward this confirmation in a Nnef_MBSTMGI_Deallocation Response message with an HTTP "204 No Content" status code to the AF.

Editor's note: Error cases and the related responses are FFS.

4.4.29.2.4 Procedure for TMGI(s) timer expiry notification

This procedure is used by the NEF to notify an AF of timer expiry for previously allocated TMGI(s).

In order to notify an AF of timer expiry for previously allocated TMGI(s), the NEF shall send a Nnef_MBSTMGI_ExpiryNotify Request message to the AF using the HTTP POST method with the request body including the ExpiryNotif data structure that shall contain:

- within the "tmgis" attribute, the list of TMGI(s) for which the timer has expired.

Upon reception of this notification request, the AF shall acknowledge its successful reception by sending a Nnef_MBSTMGI_ExpiryNotify Response message with an HTTP "204 No Content" status code.

Editor's note: Error cases and the related responses are FFS.

4.4.29.3 Procedures for MBS session management

4.4.29.3.1 General

The procedures described in the subclauses below are used by an AF to create, update and delete MBS session(s) and to subscribe to / unsubscribe from MBS Session Status notifications at the NEF. This service is applicable for both broadcast and multicast sessions, as defined in 3GPP TS 23.247 [53].

4.4.29.3.2 Procedure for MBS session creation

This procedure is used by an AF to request the creation of a multicast or a broadcast MBS session.

In order to request the creation of an MBS Session, an AF shall send a Nnef_MBSSession_Create request to the NEF using the HTTP POST method and targeting the "MBS Sessions" collection resource. With the request message body including the MbsSessionCreateReq data structure that shall contain:

- within the "afId" attribute, the identifier of the AF that is sending the request; and
- within the "mbsSession" attribute, the characteristics of the MBS session that is to be created.

The "mbsSession" attribute shall be encoded using the MbsSession data structure that shall contain:

- within the "mbsSessionId" attribute, the identifier of the MBS Session (e.g. SSM, TMGI), if available;
- within the "tmgiAllocReq" attribute, the TMGI allocation request indication, if the "mbsSessionId" attribute is either absent or does not contain a TMGI; and
- within the "serviceType" attribute, the MBS service type (i.e. multicast or broadcast);

And may further contain:

- for a multicast or a broadcast MBS session:
 - within the "ingressAddrReq" attribute, the ingress transport address request indication to indicate whether the allocation of an ingress transport address is requested or not;
 - within the "extMbsServiceArea" attribute, the MBS service area;
 - within the "activationTime" attribute, the MBS session activation time;
 - within the "terminationTime" attribute, the MBS session termination time;
 - within the "qosInformation" attribute, the QoS information defining the service requirements;
 - within the "mbsSessionSubsc" attribute, the subscription to MBS session events;
- for a multicast MBS session:
 - within the "activityStatus" attribute, the session activity status (i.e. active or inactive);
 - within the "anyUeInd" attribute, the indication of whether any UE may join the MBS session.

Editor's Note: The definition of the "qosInformation" and "eventsSubscription" attributes and the full list of attributes are FFS and will be carried out by CT4.

On successful MBS session creation, the NEF shall return a Nnef_MBSSession_Create response with an HTTP "201 Created" status code to the NF service consumer, a "Location" header that shall contain the URI of the created resource. The POST response message body shall include the MbsSessionCreateRsp data structure that shall contain:

- within the "mbsSession" attribute, a representation of the created Individual MBS Session resource;
- within the "tmgi" attribute, the allocated TMGI for the MBS session, if the MBS session creation request included a "tmgiAllocReq" attribute requesting TMGI allocation for the MBS session;

and may contain:

- within the "ingressTunAddr" attribute, the ingress MB-UPF tunnel information, if unicast transport is used over N6mb/Nmb9.

Editor's Note: It is FFS whether immediate event reports may be included in the response.

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body. If the NEF receives an error response from the MB-SMF with the HTTP "500 Internal Server Error" status code and the response body containing a ProblemDetails data structure with the "cause" attribute set to the "TRANS_RESOURCE_RES_FAILURE" application error, then the NEF shall relay this response to the NF Service Consumer (e.g. AF).

4.4.29.3.3 Procedure for MBS session update

This procedure is used by an AF to request the modification of an existing multicast or a broadcast MBS session.

In order to request the modification of an existing MBS Session, an AF send a Nnef_MBSSession_Update request using the HTTP PATCH method targeting the URI of the corresponding "Individual MBS Session" resource and the request message body including an array of PatchItem data structure(s) containing the requested modifications. Only the attributes "mbsServiceArea", "qosInformation" and "activityStatus" may be modified.

On successful MBS session modification, the NEF shall return a Nnef_MBSSession_Update response with an HTTP "204 No Content" status code.

Editor's note: Error cases and the related responses are FFS.

4.4.29.3.4 Procedure for MBS session deletion

This procedure is used by an AF to request the deletion of an existing multicast or a broadcast MBS session.

In order to request the deletion of an existing MBS Session, an AF shall send a Nnef_MBSSession_Delete request using the HTTP DELETE method targeting the URI of the concerned Individual MBS Session.

On successful release of the MBS session, the NEF shall return a Nnef_MBSSession_Delete response with an HTTP "204 No Content" status code.

Editor's note: Error cases and the related MBS responses are FFS.

4.4.29.3.5 Procedure for MBS session status subscription

This procedure is used by an AF to request to subscribe to MBS session status events notifications for a multicast or a broadcast session.

In order to request the creation of a subscription to MBS Session status events notifications, an AF shall send a Nnef_MBSSession_StatusSubscribe request to the NEF using the HTTP POST method targeting the "MBS Session Subscriptions" resource, with the request body including the MbsSessionSubsc data structure.

On successful MBS session subscription creation, the NEF shall return a Nnef_MBSSession_StatusSubscribe response with an HTTP "201 Created" status code to the AF, including a "Location" header containing the URI of the created "Individual MBS Session Subscription" resource and the response body containing a representation of the created resource within the MbsSessionSubsc data structure.

Editor's note: Error cases and the related MBS responses are FFS.

4.4.29.3.6 Procedure for MBS session status unsubscription

This procedure is used by an AF to request to delete an existing subscription to MBS session status events notifications for a multicast or a broadcast session.

In order to request the deletion of an existing subscription to MBS Session status events notifications, an AF shall send a Nnef_MBSSession_StatusUnsubscribe request to the NEF using the HTTP DELETE method targeting the corresponding "Individual MBS Session Subscription" resource.

On successful deletion of the subscription, the NEF shall return a Nnef_MBSSession_StatusUnsubscribe response with an HTTP "204 No Content" status code.

Editor's note: Error cases and the related MBS responses are FFS.

4.4.29.3.7 Procedure for MBS session status notification

This procedure is used by the NEF to send MBS session status events notifications for a multicast or a broadcast session to a previously subscribed AF.

In order to send an MBS Session status events notification, the NEF shall send a Nnef_MBSSession_StatusNotify request to the AF using the HTTP POST method, with the request body including the MbsSessionStatusNotif data structure.

Upon reception of this notification request, the AF shall acknowledge its successful reception by sending a Nnef_MBSSession_StatusNotify response message with an HTTP "204 No Content" status code.

Editor's note: Error cases and the related MBS responses are FFS.

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.

Tables 5.1-1 summarizes the APIs defined in this specification.

Table 5.1-1: API Descriptions

Service Name	Subclause defined	Description	OpenAPI Specification File	API Name	Annex
TrafficInfluence	5.4	Traffic Influence API	TS29522_TrafficInfluence.yaml	3gpp-traffic-influence	A.2
NiddConfigurationTrigger	5.5	NIDD (Non-IP Data Delivery) Configuration Trigger API	TS29522_NiddConfigurationTrigger.yaml	3gpp-nidd-configuration-trigger	A.3
AnalyticsExposure	5.6	Analytics Exposure API	TS29522_AnalyticsExposure.yaml	3gpp-analyticsexposure	A.4
5GLANParameterProvision	5.7	5G LAN Parameter Provision API	TS29522_5GLANParameterProvision.yaml	3gpp-5glan-pp	A.5
ApplyingBdtPolicy	5.8	Applying BDT Policy API	TS29522_ApplyingBdtPolicy.yaml	3gpp-applying-bdt-policy	A.6
IPTVConfiguration	5.9	IPTV Configuration API	TS29522_IPTVConfiguration.yaml	3gpp-iptvconfiguration	A.7
LpiParameterProvision	5.10	LPI (Location Privacy Indicator) Parameter Provision API	TS29522_LpiParameterProvision.yaml	3gpp-lpi-pp	A.8
ServiceParameter	5.11	Service Parameter API	TS29522_ServiceParameter.yaml	3gpp-service-parameter	A.9
ACSPParameterProvision	5.12	ACS Parameter Provision API	TS29522_ACSPParameterProvision.yaml	3gpp-acs-pp	A.10
MoLcsNotify	5.13	MO LCS Notify API	TS29522_MoLcsNotify.yaml	3gpp-mo-lcs-notify	A.11
AKMA	5.14	AKMA API	TS29522_AKMA.yaml	3gpp-akma	A.12
TimeSyncExposure	5.15	Time Sync Exposure API	TS29522_TimeSyncExposure.yaml	3gpp-time-sync-exposure	A.13
EcsAddressProvision	5.16	ECS Address Provision API	TS29522_EcsAddressProvision.yaml	3gpp-ecs-address-provision	A.14
AMPolicyAuthorization	5.17	AM Policy Authorization API	TS29522_AMPolicyAuthorization.yaml	3gpp-am-policyauthorization	A.15
AMInfluence	5.18	AM Influence API	TS29522_AMInfluence.yaml	3gpp-am-influence	A.16
MBSTMGI	5.19	MBS TMGI API	TS29522_MBSTMGI.yaml	3gpp-mbs-tmgi	A.17
MBSSession	5.20	MBS Session API	TS29522_MBSSession.yaml	3gpp-mbs-session	A.18
EASDeployment	5.21	EAS Deployment API	TS29522_EASDeployment.yaml	3gpp-eas-deployment	A.19

5.2 Information applicable to several APIs

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

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

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

5.3 Reused APIs

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

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

API Name	Differences
ResourceManagementOfBdt	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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. - The "NSAC" feature described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.
DeviceTriggering	
CpProvisioning	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - The "EthAsSessionQoS_5G", "QoSMonitoring_5G", "MacAddressRange_5G", "AlternativeQoS_5G" and "TSC_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	The "ECR_WB_5G" feature as described in subclause 5.12.4 of 3GPP TS 29.122 [4] may only be supported in 5G.

5.4 TrafficInfluence API

5.4.1 Resources

5.4.1.1 Overview

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

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

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

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

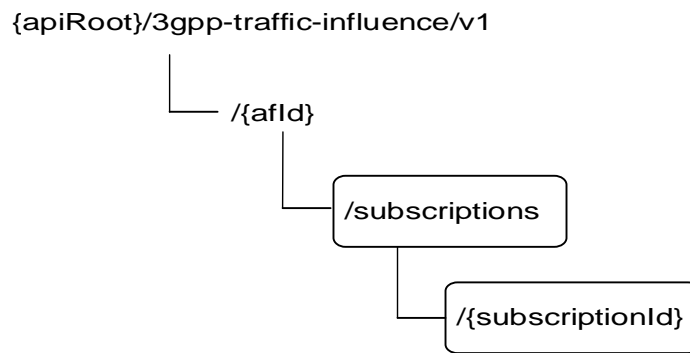


Figure 5.4.1.1-1: Resource URI structure of the TrafficInfluence API

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

Table 5.4.1.1-1: Resources and methods overview

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

5.4.1.2 Resource: Traffic Influence Subscription

5.4.1.2.1 Introduction

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

5.4.1.2.2 Resource Definition

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

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

Table 5.4.1.2.2-1: Resource URI variables for this resource

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

5.4.1.2.3 Resource Methods

5.4.1.2.3.1 General

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

5.4.1.2.3.2 GET

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.4.1.2.3.3 POST

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

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

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

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

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

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

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

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

5.4.1.3 Resource: Individual Traffic Influence Subscription

5.4.1.3.1 Introduction

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

5.4.1.3.2 Resource Definition

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

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

Table 5.4.1.3.2-1: Resource URI variables for this resource

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

5.4.1.3.3 Resource Methods

5.4.1.3.3.1 General

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

5.4.1.3.3.2 GET

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.4.1.3.3.3 PUT

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

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

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

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

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

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

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

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

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

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

5.4.1.3.3.4 PATCH

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

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

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

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

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

Data type	P	Cardinality	Response codes	Description
TrafficInfluSub	M	1	200 OK	The subscription was partial modified successfully and a representation is returned.
N/A			204 No Content	The subscription was partial modified successfully.

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

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

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

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

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

5.4.1.3.3.5 DELETE

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

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

5.4.2 Notifications

5.4.2.1 Introduction

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

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

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

Table 5.4.2.1-1: Notifications overview

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

5.4.2.2 Event Notification

5.4.2.2.1 Description

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

5.4.2.2.2 Target URI

The Callback URI "{notificationDestination}" shall be used with the callback URI variables defined in table 5.4.2.2-1.

Table 5.4.2.2-1: Callback URI variables

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

5.4.2.2.3 Operation Definition

5.4.2.2.3.1 Notification via HTTP POST

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

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

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

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

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

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

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

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

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

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

5.4.2.2.3.2 Notification via Websocket

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

5.4.2.3 Acknowledgement of event notification

5.4.2.3.1 Description

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

5.4.2.3.2 Target URI

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

Table 5.4.2.3.2-1: Callback URI variables

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

5.4.2.3.3 Operation Definition

5.4.2.3.3.1 Notification via HTTP POST

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

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

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

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

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

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

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

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

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

5.4.3 Data Model

5.4.3.1 General

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

Table 5.4.3.1-1 specifies the data types defined for the TrafficInfluence API.

Table 5.4.3.1-1: TrafficInfluence API specific Data Types

Data type	Clause defined	Description	Applicability
AfAckInfo	5.4.3.3.6	Represents acknowledgement information of a traffic influence event notification.	
AfResultInfo	5.4.3.3.5	Identifies the result of application layer handling.	
AfResultStatus	5.4.3.4.4	Represents the status of application handling result.	
EventNotification	5.4.3.3.4	Represents a traffic influence event notification.	
SubscribedEvent	5.4.3.4.3	Represents the type of UP path management events for which the AF requests to be notified.	
TrafficInfluSub	5.4.3.3.2	Represents a traffic influence subscription.	
TrafficInfluSubPatch	5.4.3.3.3	Represents parameters to request the modification of a traffic influence subscription resource.	

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.
DurationSec	3GPP TS 29.571 [8]	Identifies a period of time in units of seconds.
EasIpReplacementInfo	3GPP TS 29.571 [8]	Represents EAS IP replacement information.
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.
GeographicalArea	Clause 5.17.3.3.4	Identifies a geographical area.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
IpAddr	3GPP TS 29.571 [8]	Identifies an IP address.
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.
RouteToLocation	3GPP TS 29.571 [8]	Describes the traffic routes to the locations of the application.
Snsai	3GPP TS 29.571 [8]	Identifies the S-NSSAI.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.4.4-1.
TemporalValidity	3GPP TS 29.514 [7]	Indicates the time interval(s) during which the AF request is to be applied
UInteger	3GPP TS 29.571 [8]	Unsigned integer.
UInteger	3GPP TS 29.571 [7]	Unsigned Integer, i.e. only value 0 and integers above 0 are permissible. Minimum = 0.
UIntegerRm	3GPP TS 29.571 [7]	This data type is defined in the same way as the "UInteger" data type, but with the OpenAPI "nullable: true" property.
WebsocketNotifConfig	3GPP TS 29.122 [4]	Contains the configuration parameters to set up notification delivery over Websocket protocol.
NOTE:	In order to support a set of MAC addresses with a specific range in the traffic filter, feature MacAddressRange as specified in clause 5.4.4 shall be supported.	

5.4.3.3 Structured data types

5.4.3.3.1 Introduction

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

5.4.3.3.2 Type: TrafficInfluSub

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

Table 5.4.3.3.2-1: Definition of type TrafficInfluSub

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

websocketNotifConfig	WebsocketNotifConfig	O	0..1	Configuration parameters to set up notification delivery over Websocket protocol.	Notification_websocket
self	Link	C	0..1	Link to the created resource. This parameter shall be supplied by the NEF in HTTP responses that include an object of TrafficInfluSub type	
trafficFilters	array(FlowInfo)	O	1..N	Identifies IP packet filters. (NOTE 3)	
ethTrafficFilters	array(EthFlowDescription)	O	1..N	Identifies Ethernet packet filters. (NOTE 3)	
trafficRoutes	array(RouteToLocation)	O	1..N	Identifies the N6 traffic routing requirement.	
ffcCorrInd	boolean	O	0..1	Indication of traffic correlation. May only be included when "externalGroupIid" 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(TemporalValidity)	O	1..N	Indicates the time interval(s) during which the AF request is to be applied.	
validGeoZonelds	array(string)	O	1..N	Identifies a geographic zone that the AF request applies only to the traffic of UE(s) located in this specific zone. This attribute is deprecated; the attribute "geoAreas" should be used instead.	
geoAreas	array(GeographicalArea)	O	1..N	Identifies geographical areas within which the AF request applies. This attribute deprecates validGeoZonelds attribute.	
afAckInd	boolean	O	0..1	Identifies whether the AF acknowledgement of UP path event notification is expected. Set to "true" if the AF acknowledge is expected; otherwise set to "false". Default value is "false" if omitted.	URLLC
addrPreserInd	boolean	O	0..1	Indicates whether UE IP address should be preserved. This attribute shall set to "true" if preserved, otherwise, set to "false". Default value is "false" if omitted.	URLLC

simConnInd	boolean	O	0..1	Indication of simultaneous connectivity temporarily maintained for the source and target PSA. If it is included and set to "true", temporary simultaneous connectivity should be kept. The default value "false" applies, if the attribute is not present and has not been supplied previously.	SimultConnectivity
simConnTerm	DurationSec	O	0..1	Indication of the minimum time interval to be considered for inactivity of the traffic routed via the source PSA during the edge re-location procedure. It may be included when the "simConnInd" attribute is set to true.	SimultConnectivity
maxAllowedUpLat	UInteger	O	0..1	Indicates the target user plane latency in units of milliseconds. The SMF may use this value to decide whether edge relocation is needed to ensure that the user plane latency does not exceed the value.	AF_lantency
easIpReplacInfos	array(EasIpReplacementInfo)	O	1..N	Contains EAS IP replacement information.	EASIPreplacement
easRedisInd	boolean	O	0..1	Indicates the EAS rediscovery is required for the application if it is included and set to "true". Default value is "false" if omitted. The indication shall be invalid after it was applied unless it is provided again.	EASDiscovery
suppFeat	SupportedFeatures	C	0..1	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.	
<p>NOTE 1: Properties marked with a feature as defined in subclause 5.4.4 are applicable as described in subclause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features.</p> <p>NOTE 2: One of individual UE identifier (i.e. "gpsi", "macAddr", "ipv4Addr" or "ipv6Addr"), External Group Identifier (i.e. "externalGroupIid") or any UE indication "anyUeInd" shall be included.</p> <p>NOTE 3: One of "afApplId", "trafficFilters" or "ethTrafficFilters" shall be included.</p>					

5.4.3.3.3 Type: TrafficInfluSubPatch

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

Table 5.4.3.3.3-1: Definition of type TrafficInfluSubPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
appReloInd	boolean	O	0..1	Identifies whether an application can be relocated once a location of the application has been selected. (NOTE)	
trafficFilters	array(FlowInfo)	O	1..N	Identifies IP packet filters.	
ethTrafficFilters	array(EthFlowDescription)	O	1..N	Identifies Ethernet packet filters.	
trafficRoutes	array(RouteToLocation)	O	1..N	Identifies the N6 traffic routing requirement. (NOTE)	
tfcCorrInd	boolean	O	0..1	Indication of traffic correlation. May only be included when "externalGroupId" attribute was included within the TrafficInfluSub data type previously. It is used to indicate that for the group of UEs, the targeted PDU sessions should be correlated by a common DNAI.	
tempValidities	array(TemporalValidity)	O	1..N	Indicates the time interval(s) during which the AF request is to be applied. (NOTE)	
validGeoZonelds	array(string)	O	1..N	Identifies a geographic zone that the AF request applies only to the traffic of UE(s) located in this specific zone. (NOTE) This attribute is deprecated; the attribute "geoAreas" should be used instead.	
geoAreas	array(GeographicalArea)	O	1..N	Identifies geographical areas within which the AF request applies. (NOTE) This attribute deprecates validGeoZonelds attribute.	
afAckInd	boolean	O	0..1	Identifies whether the AF acknowledgement of UP path event notification is expected.	URLLC
addrPreserInd	boolean	O	0..1	Indicates whether UE IP address should be preserved. (NOTE)	URLLC
simConnInd	boolean	O	0..1	Indication of simultaneous connectivity temporarily maintained for the source and target PSA. If it is included and set to "true", temporary simultaneous connectivity should be kept.	SimultConnectivity
simConnTerm	DurationSec	O	0..1	Indication of the minimum time interval to be considered for inactivity of the traffic routed via the source PSA during the edge re-location procedure.	SimultConnectivity
maxAllowedUpLat	UIntegerRm	O	0..1	Indicates the target user plane latency in units of milliseconds. The SMF may use this value to decide whether edge relocation is needed to ensure that the user plane latency does not exceed the value.	AF_latency
easIpReplaceInfos	array(EasIpReplacementInfo)	O	1..N	Contains EAS IP replacement information.	EASIPreplacement
easRedisInd	boolean	O	0..1	Indicates the EAS rediscovery is required for the application if it is included and set to "true". Default value is "false" if omitted. The indication shall be invalid after it was applied unless it is provided again.	EASDiscovery
notificationDestination	Link	O	0..1	Contains the Callback URL to receive the notification from the NEF.	

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

5.4.3.3.4 Type: EventNotification

Table 5.4.3.3.4-1: Definition of type EventNotification

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

5.4.3.3.5 Type: AfResultInfo

Table 5.4.3.3.5-1: Definition of type AfResultInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
afStatus	AfResultStatus	M	1	Identifies the result of the application relocation.	
trafficRoute	RouteToLocation	O	0..1	Identifies the N6 traffic routing information associated to the target DNAI. May only be present if the "afStatus" sets to "SUCCESS".	
upBuffInd	boolean	O	0..1	If present and set to "true", it indicates that buffering of uplink traffic to the target DNAI is needed. The default value is "false". May only be present if the "afStatus" sets to "SUCCESS".	ULBuffering
easIpReplacEInfos	array(EasIpReplacementInfo)	O	1..N	Contains EAS IP replacement information.	EASIPReplacement

5.4.3.3.6 Type AfAckInfo

Table 5.4.3.3.6-1: Definition of type AfAckInfo

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

5.4.3.4 Simple data types and enumerations

5.4.3.4.1 Introduction

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

5.4.3.4.2 Simple data types

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

Table 5.4.3.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.4.3.4.3 Enumeration: SubscribedEvent

The enumeration SubscribedEvent represents the type of UP path management events for 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.
5	AF_latency	This feature indicates support for Edge relocation considering user plane latency.
6	EASDiscovery	This feature indicates the support of EAS (re)discovery.
7	EASIPreplacement	This feature indicates the support of provisioning of EAS IP replacement info.
8	ExposureToEAS	This feature indicates support for the indication provided by the AF of direct event notification of QoS monitoring events from the UPF to the Local NEF or the AF in 5GC.
9	SimultConnectivity	This feature indicates support of temporary simultaneous connectivity over source and target PSA at edge relocation.
10	ULBuffering	This feature indicates support for Uplink buffering indication for edge relocation.
Feature: A short name that can be used to refer to the bit and to the feature, e.g. "Notification".		
Description: A clear textual description of the feature.		

5.5 NiddConfigurationTrigger API

5.5.1 Resources

There is no resource defined for this API.

5.5.2 Notifications

5.5.2.1 Introduction

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

Table 5.5.2.1-1: Notifications overview

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

5.5.2.2 Event Notification

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

Table 5.5.2.2-1: Callback URI variables

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

5.5.2.3 Operation Definition

5.5.2.3.1 Notification via HTTP POST

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

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

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

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

Data type	P	Cardinality	Response codes	Description
NiddConfigurationTriggerReply	M	1	200 OK	The trigger is received successfully.
N/A			307 Temporary Redirect	Temporary redirection, during Configuration Trigger. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during Configuration Trigger. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

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

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

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

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

5.5.2.3.2 Notification via Websocket

Not specified in the present specification.

5.5.3 Data Model

5.5.3.1 General

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

5.5.3.2 Reused data types

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

Table 5.5.3.2-1: Re-used Data Types

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

5.5.3.3 Structured data types

5.5.3.3.1 Introduction

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

5.5.3.3.2 Type: NiddConfigurationTrigger

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

Table 5.5.3.3.2-1: Definition of type NiddConfigurationTrigger

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

5.5.3.3.3 Type: NiddConfigurationTriggerReply

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

Table 5.15.2.1.3-1: Definition of type NiddConfigurationTriggerReply

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

5.5.3.4 Simple data types and enumerations

5.5.3.4.1 Introduction

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

5.5.3.4.2 Simple data types

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

Table 5.5.3.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.5.4 Used Features

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

Table 5.5.4-1: Features used by NiddConfigurationTrigger API

Feature number	Feature Name	Description

5.6 AnalyticsExposure API

5.6.1 Resources

5.6.1.1 Overview

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

{apiRoot}/3gpp-analyticsexposure/v1

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

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

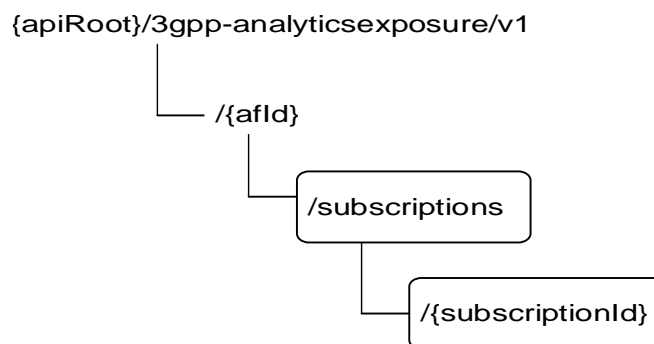


Figure 5.6.1.1-1: Resource URI structure of the AnalyticsExposure API

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

Table 5.6.1.1-1: Resources and methods overview

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

5.6.1.2 Resource: Analytics Exposure Subscriptions

5.6.1.2.1 Introduction

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

5.6.1.2.2 Resource Definition

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

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

Table 5.6.1.2.2-1: Resource URI variables for this resource

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

5.6.1.2.3 Resource Methods

5.6.1.2.3.1 General

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

5.6.1.2.3.2 GET

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

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

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

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

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.6.1.2.3.3 POST

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

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

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

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

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

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

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

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

5.6.1.3 Resource: Individual Analytics Exposure Subscription

5.6.1.3.1 Introduction

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

5.6.1.3.2 Resource Definition

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

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

Table 5.6.1.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	Subclause 5.2.4 of 3GPP TS 29.122 [4].
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	P	Cardinality	Description
supp-feat	SupportedFeatures	O	0..1	The features supported by the NF service consumer.

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.6.1.3.3.3 PUT

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

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

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

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

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

Data type	P	Cardinality	Response codes	Description
AnalyticsExposureSubsc	M	1	200 OK	The subscription was updated successfully.
N/A			204 No Content	The subscription was updated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].

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

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

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

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

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

5.6.1.3.3.4 DELETE

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.6.1a Custom Operations without associated resources

5.6.1a.1 Overview

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

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

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

5.6.1a.2 Operation: fetch

5.6.1a.2.1 Description

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

5.6.1a.2.2 Operation Definition

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

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

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

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

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

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

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

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

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

5.6.2 Notifications

5.6.2.1 Introduction

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

Table 5.6.2.1-1: Notifications overview

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

5.6.2.2 Event Notification

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

Table 5.6.2.2-1: Callback URI variables

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

5.6.2.3 Operation Definition

5.6.2.3.1 Notification via HTTP POST

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

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

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

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

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

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

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

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

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

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

5.6.2.3.2 Notification via Websocket

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

5.6.3 Data Model

5.6.3.1 General

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

Table 5.6.3.1-1 specifies the data types defined for the AnalyticsExposure API.

Table 5.6.3.1-1: AnalyticsExposure API specific Data Types

Data type	Clause defined	Description	Applicability
AbnormalExposure	5.6.3.3.15	Represents a user's abnormal behavior information.	Abnormal_Behavior
AnalyticsData	5.6.3.3.14	Represents analytics data.	
AnalyticsEvent	5.6.3.4.3	Event that is subscribed.	
AnalyticsEventFilter	5.6.3.3.13	Represents analytics event filter information.	
AnalyticsEventFilterSubsc	5.6.3.3.6	Represents an analytics event filter.	
AnalyticsEventNotif	5.4.3.3.4	Represents an analytics event to be reported.	
AnalyticsEventNotification	5.6.3.3.3	Represents an analytics event(s) notification.	
AnalyticsEventSubsc	5.6.3.3.5	Represents a subscribed analytics event.	
AnalyticsExposureSubsc	5.6.3.3.2	Represents an analytics exposure subscription.	
AnalyticsFailureCode	5.6.3.4.4	Identifies the failure reason.	
AnalyticsFailureEventInfo	5.6.3.3.20	Represents an event for which the subscription request was not successful and including the associated failure reason.	
AnalyticsRequest	5.6.3.3.12	Represents the parameters to request to retrieve analytics information.	
CongestInfo	5.6.3.3.16	Represents a UE's user data congestion information.	Congestion
CongestionAnalytics	5.6.3.3.17	Represents data congestion analytics for transfer over the user plane, control plane or both.	
NetworkPerfExposure	5.6.3.3.19	Represents network performance information.	Network_Performance
QoS_SustainabilityExposure	5.6.3.3.18	Represents a QoS sustainability information.	QoS_Sustainability
TargetUeId	5.6.3.3.7	Represents the target UE(s) information.	
UeLocationInfo	5.6.3.3.10	Represents a UE location information.	
UeMobilityExposure	5.6.3.3.9	Represents a UE mobility information.	Ue_Mobility

5.6.3.2 Reused data types

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

Table 5.6.3.2-1: Re-used Data Types

Data type	Reference	Comments
AdditionalMeasurement	3GPP TS 29.520 [27]	
AnalyticsSubset	3GPP TS 29.520 [27]	Analytics Subset.
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]	
DispersionInfo	3GPP TS 29.520 [27]	Dispersion information.
DispersionRequirement	3GPP TS 29.520 [27]	Dispersion requirement.
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	P	Cardinality	Description	Applicability (NOTE)
analyEventsSubs	array(AnalyticsEventSubsc)	M	1..N	Subscribed analytics events.	
analyRepInfo	ReportingInformation	O	0..1	Reporting requirement information of the subscription. If omitted, the default values within the ReportingInformation data type apply.	
notifUri	Uri	M	1	Notification URI for analytics event reporting.	
notifId	string	M	1	Notification Correlation ID assigned by the NF service consumer.	
eventNotifis	array(AnalyticsEventNotif)	C	1..N	Represents the Events to be reported. Shall only be present if the immediate reporting indication in the "immRep" attribute within the "analyRepInfo" attribute sets to true during the event subscription, and the reports are available.	
failEventReports	array(AnalyticsFailureEventInfo)	O	1..N	Supplied by the NWDAF. When available, shall contain the event(s) for which the subscription is not successful, including the failure reason(s).	
suppFeat	SupportedFeatures	C	0..1	Indicates the list of Supported features used as described in subclause 5.6.4. This attribute shall be provided in the POST request and in the response of successful resource creation, or in the HTTP GET response if the "supp-feat" attribute query parameter is included in the HTTP GET request.	
self	Link	C	0..1	Identifies the Individual Analytics Exposure Subscription resource. Shall be present in the HTTP GET response when reading all the subscriptions for an AF.	
requestTestNotification	boolean	O	0..1	Set to true by the AF to request the NEF to send a test notification as defined in subclause 5.2.5.3 of 3GPP TS 29.122 [4]. Set to false or omitted otherwise.	Notification_test_event
websocketNotifConfig	WebsocketNotifConfig	O	0..1	Configuration parameters to set up notification delivery over Websocket protocol.	Notification_websocket
NOTE: Properties marked with a feature as defined in subclause 5.6.4 are applicable as described in subclause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features.					

5.6.3.3.3 Type: AnalyticsEventNotification

Table 5.6.3.3.3-1: Definition of type AnalyticsEventNotification

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

5.6.3.3.4 Type: AnalyticsEventNotif

Table 5.6.3.3.4-1: Definition of type AnalyticsEventNotif

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

5.6.3.3.5 Type: AnalyticsEventSubsc

Table 5.6.3.3.5-1: Definition of type AnalyticsEventSubsc

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

5.6.3.3.6 Type: AnalyticsEventFilterSubsc

Table 5.6.3.3.6-1: Definition of type AnalyticsEventFilterSubsc

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

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

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

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

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

NOTE 5: For "QOS_SUSTAINABILITY", this property shall be provided if the "notifMethod" in "analyRepInfo" is set to "ON_EVENT_DETECTION" or omitted.

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

NOTE 7: For "ABNORMAL_BEHAVIOR" event with "anyUeId" attribute in "tgtUe" attribute sets to true,

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

5.6.3.3.7 Type TargetUeId

Table 5.6.3.3.7-1: Definition of type TargetUeId

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

5.6.3.3.8 Void

5.6.3.3.9 Type UeMobilityExposure

Table 5.6.3.3.9-1: Definition of type UeMobilityExposure

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

5.6.3.3.10 Type UeLocationInfo

Table 5.6.3.3.10-1: Definition of type UeLocationInfo

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

5.6.3.3.11 Void

5.6.3.3.12 Type: AnalyticsRequest

Table 5.6.3.3.12-1: Definition of type AnalyticsRequest

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

5.6.3.3.13 Type AnalyticsEventFilter

Table 5.6.3.3.13-1: Definition of type AnalyticsEventFilter

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

5.6.3.3.14 Type AnalyticsData

Table 5.6.3.3.14-1: Definition of type AnalyticsData

Attribute name	Data type	P	Cardinality	Description	Applicability
expiry	DateTime	O	0..1	Defines the expiration time after which the analytics information will become invalid.	
ueMobilityInfos	array(UeMobilityExposure)	C	1..N	Contains the UE mobility information. Shall be present if the "analyEvent" attribute sets to "UE_MOBILITY"	Ue_Mobility
ueCommInfos	array(UeCommunication)	C	1..N	Contains the application communication information. Shall be present if the "analyEvent" attribute sets to "UE_COMM"	Ue_Communication
nwPerfInfos	array(NetworkPerfExposure)	C	1..N	The network performance information. Shall be present when the requested event is "NETWORK_PERFORMANCE".	Network_Performance
abnormallInfos	array(AbnormalExposure)	C	1..N	Contains the user's abnormal behavior information. Shall be present if the "analyEvent" attribute sets to "ABNORMAL_BEHAVIOR"	Abnormal_Behavior
congestInfos	array(CongestInfo)	C	1..N	Contains the UE's user data congestion information. Shall be present if the "analyEvent" attribute sets to "CONGESTION"	Congestion
qosSustainInfos	array(QosSustainabilityExposure)	C	1..N	Contains the QoS sustainability information. Shall be present if the "analyEvent" attribute is set to "QOS_SUSTAINABILITY"	QoS_Sustainability
disperInfos	array(DispersionInfo)	C	1..N	Contains the Dispersion information. Shall be present if the "analyEvent" attribute is set to "DISPERSION".	Dispersion
supFeat	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	P	Cardinality	Description	Applicability
gpsis	array(Gpsi)	C	1..N	Each element identifies a UE which is affected with the Exception. Shall be present if the subscription request applies to more than one UE.	
excep	Exception	M	1	Contains the exception information.	
appld	ApplicationId	O	0..1	Identifies an application. May only be present if the "appls" attribute was provided within AnalyticsEventFilter during the subscription for event notification procedure.	
ratio	SamplingRatio	C	0..1	This attribute contains the percentage of UEs with same analytics result in the group or among all UEs. Shall be present if the analytics result applies for a group of UEs or any UE.	
confidence	UInteger	C	0..1	Indicates the confidence of the prediction. (NOTE) Shall be present if the analytics result is a prediction.	
addtMeasInfo	AdditionalMeasurement	O	0..1	Additional measurement.	
NOTE: If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned.					

5.6.3.3.16 Type CongestInfo

Table 5.6.3.3.16-1: Definition of type CongestInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
locArea	LocationArea5G	M	1	Network area of interest. (NOTE)	
cngAnas	array(CongestionAnalytics)	M	1..N	Represents data congestion analytics for transfer over the user plane, control plane or both planes.	
NOTE: The NetworkAreaInfo data within the LocationArea5G data is not applicable.					

5.6.3.3.17 Type CongestionAnalytics

Table 5.6.3.3.17-1: Definition of type CongestionAnalytics

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

5.6.3.3.18 Type QoSustainabilityExposure

Table 5.6.3.3.18-1: Definition of type QoSustainabilityExposure

Attribute name	Data type	P	Cardinality	Description	Applicability
locArea	LocationArea5G	M	1	Identification(s) of applicable location areas where the analytics result applies. (NOTE 3)	
startTs	DateTime	M	1	Represents the start time of the applicable observing period.	
endTs	DateTime	M	1	Represents the end time of the applicable observing period.	
qosFlowRetThd	RetainabilityThreshold	O	0..1	The reporting QoS Flow Retainability Threshold that are met or crossed for 5QI of GBR resource type. (NOTE 1)	
ranUeThrouThd	BitRate	O	0..1	The reporting RAN UE Throughput Threshold that are met or crossed for 5QI of non-GBR resource type. (NOTE 1)	
confidence	UInteger	C	0..1	Indicates the confidence of the prediction. (NOTE 2) 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. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned.					
NOTE 3: The NetworkAreaInfo data within the LocationArea5G data is not applicable.					

5.6.3.3.19 Type NetworkPerfExposure

Table 5.6.3.3.19-1: Definition of type NetworkPerfExposure

Attribute name	Data type	P	Cardinality	Description	Applicability
locArea	LocationArea5G	M	1	Identification of network area to which the subscription applies. (NOTE 3)	
nwPerfType	NetworkPerfType	M	1	The type of the network performance	
relativeRatio	SamplingRatio	O	0..1	The reported relative ratio expressed in percentage. (NOTE 1)	
absoluteNum	UInteger	O	0..1	The reported absolute number (NOTE 1)	
confidence	UInteger	C	0..1	Indicates the confidence of the prediction. (NOTE 2) 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. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned.					
NOTE 3: The NetworkAreaInfo data within the LocationArea5G data is not applicable.					

5.6.3.3.20 Type AnalyticsFailureEventInfo

Table 5.6.3.3.20-1: Definition of type AnalyticsFailureEventInfo

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

5.6.3.4 Simple data types and enumerations

5.6.3.4.1 Introduction

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

5.6.3.4.2 Simple data types

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

Table 5.6.3.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.6.3.4.3 Enumeration: AnalyticsEvent

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

Table 5.6.3.4.3-1: Enumeration AnalyticsEvent

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

5.6.3.4.4 Enumeration: AnalyticsFailureCode

Table 5.6.3.4.4-1: Enumeration AnalyticsFailureCode

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

5.6.4 Used Features

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

Table 5.6.4-1: Features used by AnalyticsExposure API

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

5.6.5 Error handling

5.6.5.1 General

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

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

5.6.5.2 Protocol Errors

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

5.6.5.3 Application Errors

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

Table 5.6.5.3-1: Application errors

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

5.7 5GLANParameterProvision API

5.7.1 Resources

5.7.1.1 Overview

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

{apiRoot}/3gpp-5gla-pp/v1

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

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

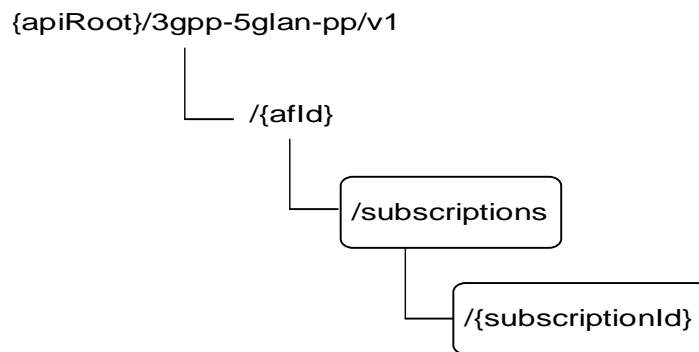


Figure 5.7.1.1-1: Resource URI structure of the 5GLANParameterProvision API

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

Table 5.7.1.1-1: Resources and methods overview

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

5.7.1.2 Resource: 5GLAN Parameters Provision Subscriptions

5.7.1.2.1 Introduction

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

5.7.1.2.2 Resource Definition

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

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

Table 5.7.1.2.2-1: Resource URI variables for this resource

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

5.7.1.2.3 Resource Methods

5.7.1.2.3.1 General

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

5.7.1.2.3.2 GET

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.7.1.2.3.3 POST

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

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

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

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

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

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

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

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

5.7.1.3 Resource: Individual 5GLAN Parameters Provision Subscription

5.7.1.3.1 Introduction

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

5.7.1.3.2 Resource Definition

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

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

Table 5.7.1.3.2-1: Resource URI variables for this resource

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

5.7.1.3.3 Resource Methods

5.7.1.3.3.1 General

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

5.7.1.3.3.2 GET

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.7.1.3.3.3 PUT

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

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

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

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

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

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

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

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

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

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

5.7.1.3.3.4 DELETE

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.7.1.3.3.5 PATCH

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

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

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

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

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

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

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

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

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

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

5.7.1a Notifications

Notifications are not applicable to this API.

5.7.2 Data Model

5.7.2.1 General

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

Table 5.7.2.1-1 specifies the data types defined for the 5GLANParameterProvision API.

Table 5.7.2.1-1: 5GLANParameterProvision API specific Data Types

Data type	Clause defined	Description	Applicability
5GLanParameters	5.7.2.3.3	Represents 5G LAN service related parameters that need to be provisioned.	
5GLanParametersPatch	5.7.2.3.6	Represents 5G LAN service related parameters that need to be modified.	
5GLanParametersProvision	5.7.2.3.2	Represents an individual 5G LAN parameters provision subscription resource.	
5GLanParametersProvisionPatch	5.7.2.3.5	Represents the 5G LAN parameters to request the modification of a subscription to provision parameters.	
AaaUsage	5.7.2.4.3	Represents the usage of the DN-AAA server.	
AppDescriptor	5.7.2.3.4	Represents an operation system and the corresponding applications.	
AppDescriptorRm	5.7.2.3.7	Represents the same as the AppDescriptor data type but with the "nullable: true" property.	

5.7.2.2 Reused data types

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

Table 5.7.2.2-1: Re-used Data Types

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

5.7.2.3 Structured data types

5.7.2.3.1 Introduction

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

5.7.2.3.2 Type: 5GLanParametersProvision

Table 5.7.2.3.2-1: Definition of type 5GLanParametersProvision

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

5.7.2.3.3 Type: 5GLanParameters

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

Table 5.7.2.3.3-1: Definition of type 5GLanParameters

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

5.7.2.3.4 Type: AppDescriptor

Table 5.7.2.3.4-1: Definition of type AppDescriptor

Attribute name	Data type	P	Cardinality	Description	Applicability
osId	OsId	M	1	Identifies an operating system supported by the UE.	
appls	map(ApplicationId)	M	1..N	Identifies applications that is running on the UE's operating system. Any string value can be used as a key of the map.	

5.7.2.3.5 Type: 5GLanParametersProvisionPatch

Table 5.7.2.3.5-1: Definition of type 5GLanParametersProvisionPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
5gLanParamsPatch	5GLanParametersPatch	O	0..1	Represents the 5G LAN service related parameters.	

5.7.2.3.6 Type: 5GLanParametersPatch

Table 5.7.2.3.6-1: Definition of type 5GLanParametersPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
gpsis	map(GpsiRm)	O	1..N	Represents the list of 5G VN Group members, each member is identified by GPSI. Any string value can be used as a key of the map.	
appDesps	map(AppDescriptorRm)	O	1..N	Describes the operation systems and the corresponding applications for each operation system. The key of map is osId.	

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
appls	map(ApplicationIdRm)	O	1..N	Identifies application(s) on the UE's operating system. Any string value can be used as a key of the map.	

5.7.2.3.8 Void

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

5.7.2.4.3 Enumeration: AaaUsage

Table 5.7.2.4.3-1: Enumeration AaaUsage

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

5.7.3 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
1	multipleSessionTypes	Indicates that multiple allowed PDU Session Types can be provided for a 5G VN group.

5.8 ApplyingBdtPolicy API

5.8.1 Resources

5.8.1.1 Overview

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

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

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

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

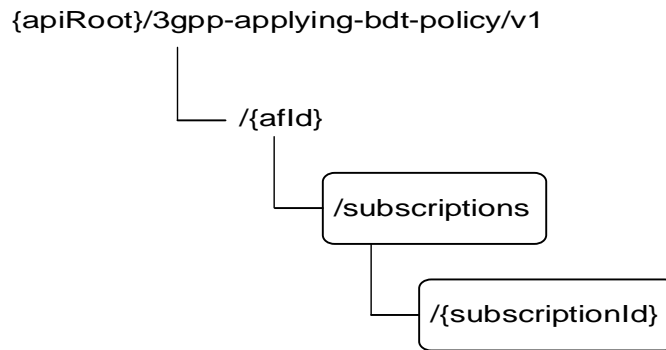


Figure 5.8.1.1-1: Resource URI structure of the ApplyingBdtPolicy API

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

Table 5.8.1.1-1: Resources and methods overview

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

5.8.1.2 Resource: Applied BDT Policy Subscriptions

5.8.1.2.1 Introduction

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

5.8.1.2.2 Resource Definition

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

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

Table 5.8.1.2.2-1: Resource URI variables for this resource

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

5.8.1.2.3 Resource Methods

5.8.1.2.3.1 General

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

5.8.1.2.3.2 GET

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.8.1.2.3.3 POST

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

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

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

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

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

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

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

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

5.8.1.3 Resource: Individual Applied BDT Policy Subscription

5.8.1.3.1 Introduction

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

5.8.1.3.2 Resource Definition

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

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

Table 5.8.1.3.2-1: Resource URI variables for this resource

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

5.8.1.3.3 Resource Methods

5.8.1.3.3.1 General

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

5.8.1.3.3.2 GET

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.8.1.3.3.3 PATCH

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

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

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

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

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

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

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

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

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

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

5.8.1.3.3.4 DELETE

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.8.2 Notifications

Notifications are not applicable to this API.

5.8.3 Data Model

5.8.3.1 General

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

Table 5.8.3.1-1 specifies the data types defined for the ApplyingBdtPolicy API.

Table 5.8.3.1-1: ApplyingBdtPolicy API specific Data Types

Data type	Clause defined	Description	Applicability
AppliedBdtPolicy	5.8.3.3.2	Represents an applied BDT policy.	
AppliedBdtPolicyPatch	5.8.3.3.3	Represents the parameters to request the modification of a subscription to applied BDT policy.	

5.8.3.2 Reused data types

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

Table 5.8.3.2-1: Re-used Data Types

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

5.8.3.3 Structured data types

5.8.3.3.1 Introduction

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

5.8.3.3.2 Type: AppliedBdtPolicy

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

Table 5.8.3.3.2-1: Definition of type AppliedBdtPolicy

Attribute name	Data type	P	Cardinality	Description	Applicability (NOTE)
bdtRefld	BdtReferenceld	M	1	Identifies a selected policy of background data transfer.	
gpsi	Gpsi	C	0..1	Identifies a user.	
externalGroupld	ExternalGroupld	C	0..1	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	
self	Link	C	0..1	Identifies the Individual Applied BDT Policy Subscription resource. Shall be present in the HTTP GET response when reading all the subscriptions for an AF.	
NOTE: Only one of the properties "gpsi" or "externalGroupld" shall be included.					

5.8.3.3.3 Type: AppliedBdtPolicyPatch

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

Table 5.8.3.3.2-1: Definition of type AppliedBdtPolicyPatch

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

5.8.3.4 Simple data types and enumerations

5.8.3.4.1 Introduction

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

5.8.3.4.2 Simple data types

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

Table 5.8.3.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.8.4 Used Features

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

Table 5.8.4-1: Features used by ApplyingBdtPolicy API

Feature number	Feature Name	Description

5.9 IPTVConfiguration API

5.9.1 Resources

5.9.1.1 Overview

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

{apiRoot}/3gpp-iptvconfiguration/v1

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

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

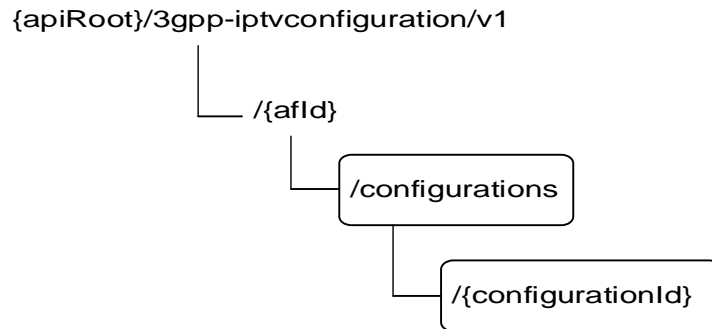


Figure 5.9.1.1-1: Resource URI structure of the IPTVConfiguration API

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

Table 5.9.1.1-1: Resources and methods overview

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

5.9.1.2 Resource: IPTV Configurations

5.9.1.2.1 Introduction

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

5.9.1.2.2 Resource Definition

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

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

Table 5.9.1.2.2-1: Resource URI variables for this resource

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

5.9.1.2.3 Resource Methods

5.9.1.2.3.1 General

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

5.9.1.2.3.2 GET

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

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.9.1.2.3.3 POST

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

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

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

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

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

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

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

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

5.9.1.3 Resource: Individual IPTV Configuration

5.9.1.3.1 Introduction

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

5.9.1.3.2 Resource Definition

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

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

Table 5.9.1.3.2-1: Resource URI variables for this resource

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

5.9.1.3.3 Resource Methods

5.9.1.3.3.1 General

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

5.9.1.3.3.2 GET

The GET method allows to read the active configuration for a given AF and subscription Id. The AF shall initiate the HTTP GET request message and 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	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.9.1.3.3.3 PUT

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

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

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

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

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

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

Table 5.9.1.3.3.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.9.1.3.3.3-4: Headers supported by the 308 Response Code on this resource

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

5.9.1.3.3.4 DELETE

The DELETE method deletes an existing individual configuration for a given AF. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.9.1.3.3.4-1.

Table 5.9.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.9.1.3.3.4-2 and the response data structures and response codes specified in table 5.9.1.3.3.4-3.

Table 5.9.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.9.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

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

Table 5.9.1.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.9.1.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.9.1.3.3.5 PATCH

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

This method shall support the request data structures specified in table 5.9.1.3.3.5-1 and the response data structures and response codes specified in table 5.9.1.3.3.5-2.

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

Data type	P	Cardinality	Description
IptvConfigDataPatch	M	1	Partial update an existing configuration.

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

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

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

Table 5.9.1.3.3.5-3: Headers supported by the 307 Response Code on this resource

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

Table 5.9.1.3.3.5-4: Headers supported by the 308 Response Code on this resource

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

5.9.1A Notifications

Notifications are not applicable to this API.

5.9.2 Data Model

5.9.2.1 General

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

Table 5.9.2.1-1 specifies the data types defined for the IPTVConfiguration API.

Table 5.9.2.1-1: IPTVConfiguration API specific Data Types

Data type	Clause defined	Description	Applicability
AccessRightStatus	5.9.2.4.3	Represents the access right status for parameter provision.	
IptvConfigData	5.9.2.3.2	Represents an individual IPTV Configuration resource.	
IptvConfigDataPatch	5.9.2.3.4	Represents the parameters to request the modification of an IPTV Configuration resource.	
MulticastAccessControl	5.9.2.3.3	Represents multicast address access control information.	

5.9.2.2 Reused data types

The data types reused by the IPTVConfiguration API from other specifications are listed in table 5.9.2.2-1.

Table 5.9.2.2-1: Re-used Data Types

Data type	Reference	Comments
Dnn	3GPP TS 29.571 [8]	Identifies a DNN.
ExternalGroupld	3GPP TS 29.122 [4]	External Group Identifier for a user group.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
Ipv4Addr	3GPP TS 29.571 [8]	Identifies an IPv4 address.
Ipv6Addr	3GPP TS 29.571 [8]	Identifies an IPv6 address.
Link	3GPP TS 29.122 [4]	
MtcProviderInformation	3GPP TS 29.571 [8]	Indicates MTC provider information.
Snsai	3GPP TS 29.571 [8]	Identifies the S-NSSAI.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.9.3-1.

5.9.2.3 Structured data types

5.9.2.3.1 Introduction

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

5.9.2.3.2 Type: IptvConfigData

Table 5.9.2.3.2-1: Definition of type IptvConfigData

Attribute name	Data type	P	Cardinality	Description	Applicability
self	Link	C	0..1	Identifies the individual IPTV configuration resource URI. Shall be present in the HTTP GET response when reading all the configurations for an AF.	
gpsi	Gpsi	C	0..1	Identifies GPSI. (NOTE)	
exterGroupld	ExternalGroupld	C	0..1	Represents a group of users. (NOTE)	
afAppld	string	M	1	Identifies an application.	
dnn	Dnn	O	0..1	Identifies a DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only.	
snsai	Snsai	O	0..1	Identifies an S-NSSAI.	
multiAccCtrls	map(MulticastAccessControl)	M	1..N	Identifies a list of multicast address access control information. Any string value can be used as a key of the map.	
mtcProviderld	MtcProviderInformation	O	0..1	Indicates MTC provider information.	
suppFeat	SupportedFeatures	M	1	Indicates the negotiated supported features.	

NOTE: Only one of the "gpsi" or "exterGroupld" attribute shall be provided.

5.9.2.3.3 Type: MulticastAccessControl

Table 5.9.2.3.3-1: Definition of type MulticastAccessControl

Attribute name	Data type	P	Cardinality	Description	Applicability
srclpv4Addr	Ipv4Addr	O	0..1	Identifies the source IPv4 address of IPTV multicast channel.	
srclpv6Addr	Ipv6Addr	O	0..1	Identifies the source IPv6 address of IPTV multicast channel.	
multicastV4Addr	Ipv4Addr	O	0..1	Identifies the multicast IPv4 address of IPTV multicast channel. (NOTE)	
multicastV6Addr	Ipv6Addr	O	0..1	Identifies the multicast IPv6 address of IPTV multicast channel. (NOTE)	
accStatus	AccessRightStatus	M	1	Represents access right status of the multicast channel.	
NOTE: At least one of the "multicastV4Addr" or "multicastV6Addr" attribute shall be provided.					

5.9.2.3.4 Type: IptvConfigDataPatch

Table 5.9.2.3.4-1: Definition of type IptvConfigDataPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
multiAccCtrls	map(MulticastAccessControl)	O	1..N	Identifies a list of multicast address access control information. Any string value can be used as a key of the map.	

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 AccessRightStatus

Enumeration value	Description
FULLY_ALLOWED	The User is fully allowed to access to the channel.
PREVIEW_ALLOWED	The User is preview allowed to access to the channel.
NO_ALLOWED	The User is not allowed to access to the channel.

5.9.3 Used Features

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

Table 5.9.3-1: Features used by IPTVConfiguration API

Feature number	Feature Name	Description

5.10 LpiParameterProvision API

5.10.1 Resources

5.10.1.1 Overview

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

{apiRoot}/3gpp-lpi-pp/v1

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

This subclause describes the structure for the Resource URIs as shown in figure 5.10.1.1-1 and the resources and HTTP methods used for the LpiParameterProvision API.

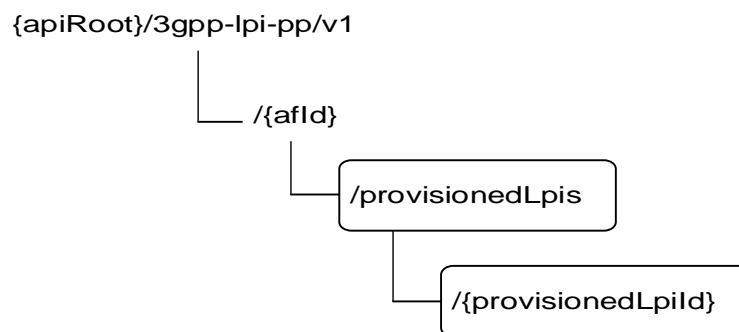


Figure 5.10.1.1-1: Resource URI structure of the LpiParameterProvision API

Table 5.10.1.1-1 provides an overview of the resources and HTTP methods applicable for the LpiParameterProvision API.

Table 5.10.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
LPI Parameters Provisionings	/{afld}/provisionedLpis	GET	Read all LPI Parameters Provisioning resources for a given AF
		POST	Create a new Individual LPI Parameters Provisioning resource
Individual LPI Parameters Provisioning	/{afld}/provisionedLpis/{provisionedLpild}	GET	Read an existing Individual LPI Parameters Provisioning resource identified by {provisionedLpild}
		PUT	Update all of the properties of an existing Individual LPI Parameters Provisioning resource identified by {provisionedLpild}
		PATCH	Modify an existing Individual LPI Parameters Provisioning resource identified by {provisionedLpild}.
		DELETE	Delete an existing Individual LPI Parameters Provisioning resource identified by {provisionedLpild}

5.10.1.2 Resource: LPI Parameters Provisionings

5.10.1.2.1 Introduction

This resource allows a AF to read all active LPI Parameters Provisionings for the given AF, or create an new individual LPI Parameters Provisioning resource to provision parameters to the NEF.

5.10.1.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-lpi-pp/v1/{afld}/provisionedLpis

This resource shall support the resource URI variables defined in table 5.10.1.2.2-1.

Table 5.10.1.2.2-1: Resource URI variables for this resource

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

5.10.1.2.3 Resource Methods

5.10.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.10.1.2.3.

5.10.1.2.3.2 GET

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

This method shall support the URI query parameters specified in table 5.10.1.2.3.2-1.

Table 5.10.1.2.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.10.1.2.3.2-2 and the response data structures and response codes specified in table 5.10.1.2.3.2-3.

Table 5.10.1.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.10.1.2.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.10.1.2.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.10.1.2.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.10.1.2.3.3 POST

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

This method shall support the request data structures specified in table 5.10.1.2.3.3-1 and the response data structures and response codes specified in table 5.10.1.2.3.3-2.

Table 5.10.1.2.3.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
LpiParametersProvisioning	M	1	Parameters to create an Individual LPI Parameters Provisioning resource to provision parameters.

Table 5.10.1.2.3.3-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
LpiParametersProvision	M	1	201 Created	The 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 5.10.1.2.3.3-3: Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-lpi-pp/v1/{afld}/provisionedLpis/{provisionedLpild}

5.10.1.3 Resource: Individual LPI Parameters Provisioning

5.10.1.3.1 Introduction

This resource allows a AF to read, update or delete an existing Individual LPI Parameters Provisioning resource.

5.10.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-lpi-pp/v1/{afld}/provisionedLpis/{provisionedLpiId}

This resource shall support the resource URI variables defined in table 5.10.1.3.2-1.

Table 5.10.1.3.2-1: Resource URI variables for this resource

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

5.10.1.3.3 Resource Methods

5.10.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.10.1.3.3.

5.10.1.3.3.2 GET

The GET method allows to read an active Individual LPI Parameters Provisioning resource for a given AF and provisionedLpiId. The AF shall initiate the HTTP GET request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.10.1.3.3.2-1.

Table 5.10.1.3.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.10.1.3.3.2-2 and the response data structures and response codes specified in table 5.10.1.3.3.2-3.

Table 5.10.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.10.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.10.1.3.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.10.1.3.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.10.1.3.3.3 PUT

The PUT method updates an existing resource to update an existing Individual LPI Parameters Provisioning resource. The AF shall initiate the HTTP PUT request message and the NEF shall respond to the message.

This method shall support the request data structures specified in table 5.10.1.3.3.3-1 and the response data structures and response codes specified in table 5.10.1.3.3.3-2.

Table 5.10.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
LpiParametersProvision	M	1	Update an existing individual LPI Parameters Provisioning resource to provision parameters.

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

Data type	P	Cardinality	Response codes	Description
LpiParametersProvision	M	1	200 OK	The resource was updated successfully and a representation of the updated resource is returned.

n/a			204 No Content	The resource was updated successfully and no additional content is sent in the response message.
n/a			307 Temporary Redirect	Temporary redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.10.1.3.3.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.10.1.3.3.3-4: Headers supported by the 308 Response Code on this resource

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

5.10.1.3.3.3a PATCH

The PATCH method modifies an existing resource to update an existing individual LPI Parameters Provisioning resource. 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 5.10.1.3.3.3a-1 and the response data structures and response codes specified in table 5.10.1.3.3.3a-2.

Table 5.10.1.3.3.3a-1: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
LpiParametersProvisionPatch	M	1	Modify an existing individual LPI Parameters Provisioning resource to provision parameters.

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

Data type	P	Cardinality	Response codes	Description
LpiParametersProvision	M	1	200 OK	The resource was updated successfully and a representation of the updated resource is returned.
n/a			204 No Content	The resource was updated successfully and no additional content is sent in the response message.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].

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

Table 5.10.1.3.3.3a-3: Headers supported by the 307 Response Code on this resource

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

Table 5.10.1.3.3.3a-4: Headers supported by the 308 Response Code on this resource

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

5.10.1.3.3.4 DELETE

The DELETE method deletes an existing individual LPI Parameters Provisioning resource for a given AF. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.10.1.3.3.4-1.

Table 5.10.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.10.1.3.3.4-2 and the response data structures and response codes specified in table 5.10.1.3.3.4-3.

Table 5.10.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.10.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

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

Table 5.10.1.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.10.1.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.10.2 Data Model

5.10.2.1 General

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

Table 5.10.2.1-1 specifies the data types defined for the LpiParameterProvision API.

Table 5.10.2.1-1: LpiParameterProvision API specific Data Types

Data type	Clause defined	Description	Applicability
LpiParametersProvision	5.10.2.3.2	Represents an individual LPI Parameters Provisioning resource.	

5.10.2.2 Reused data types

The data types reused by the LpiParameterProvision API from other specifications are listed in table 5.10.2.2-1.

Table 5.10.2.2-1: Re-used Data Types

Data type	Reference	Comments
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user group.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
Link	3GPP TS 29.122 [4]	Identifies a referenced resource.
Lpi	3GPP TS 29.503 [17]	Identifies the Location Privacy Indication information.
MtcProviderInformation	3GPP TS 29.571 [8]	Indicates MTC provider information for LCS privacy parameter configuration authorization.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.10.3-1.

5.10.2.3 Structured data types

5.10.2.3.1 Introduction

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

5.10.2.3.2 Type: LpiParametersProvision

Table 5.10.2.3.2-1: Definition of type LpiParametersProvision

Attribute name	Data type	P	Cardinality	Description	Applicability
self	Link	C	0..1	Identifies the individual parameters provisioning resource. This attribute shall be supplied by the NEF in HTTP responses that include an object of LpiParametersProvision type.	
exterGroupId	ExternalGroupId	O	0..1	Identifies a group of UEs. (NOTE 1)	
gpsi	Gpsi	O	0..1	Identifies an UE with GPSI. (NOTE 1))	
lpi	Lpi	M	1	Location Privacy Indication parameters	
mtcProviderId	MtcProviderInformation	O	0..1	Indicates MTC provider information for LCS privacy parameter configuration authorization. (NOTE 2))	
suppFeat	SupportedFeatures	M	1	Indicates the negotiated supported features.	
NOTE 1: Only one of the "gpsi" or "exterGroupId" attribute shall be provided.					
NOTE 2: The NEF should check received MTC Provider information and then the NEF may:					
<ul style="list-style-type: none"> - override it with local configured value and send it to UDM; - send it directly to the UDM; or - reject the LPI Parameter Provisioning request. 					

5.10.2.3.3 Type: LpiParametersProvisionPatch

Table 5.10.2.3.3-1: Definition of type LpiParametersProvisionPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
lpi	Lpi	O	1	Location Privacy Indication parameters	
mtcProviderId	MtcProviderInformation	O	0..1	Indicates MTC provider information for LCS privacy parameter configuration authorization. (NOTE 1)	
NOTE 1: The NEF should check received MTC Provider information and then the NEF may:					
<ul style="list-style-type: none"> - override it with local configured value and send it to UDM; - send it directly to the UDM; or - reject the LPI Parameter Provisioning modification request. 					

5.10.2.4 Simple data types and enumerations

5.10.2.4.1 Introduction

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

5.10.2.4.2 Simple data types

The simple data types defined in table 5.10.2.4.2-1 shall be supported.

Table 5.10.2.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.10.3 Used Features

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

Table 5.10.3-1: Features used by LpiParameterProvision API

Feature number	Feature Name	Description
1	PatchUpdate	Indicates the support of enhancements to the northbound interfaces (e.g. support the partial modification of an existing resource).

5.11 ServiceParameter API

5.11.1 Resources

5.11.1.1 Overview

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

{apiRoot}/3gpp-service-parameter/v1

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

This subclause describes the structure for the Resource URIs as shown in figure 5.11.1.1-1 and the resources and HTTP methods used for the ServiceParameter API.

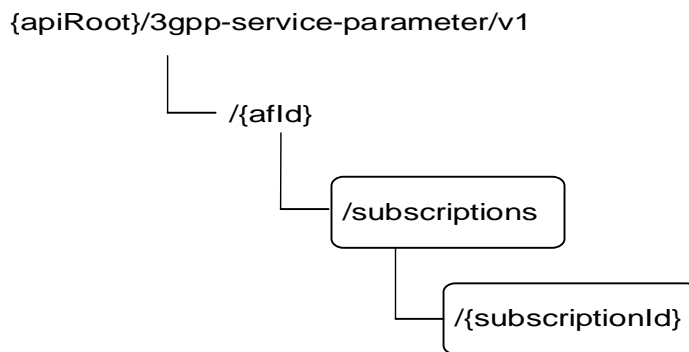


Figure 5.9.1.1-1: Resource URI structure of the ServiceParameter API

Table 5.11.1.1-1 provides an overview of the resources and HTTP methods applicable for the ServiceParameter API.

Table 5.9.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
Service Parameter Subscriptions	/{afld}/subscriptions	GET	Read all subscriptions for a given AF.
		POST	Create a new service parameter subscription.
Individual Service Parameter Subscription	/{afld}/subscriptions/{subscriptionId}	GET	Read an existing subscription identified by {subscriptionId}
		PUT	Modify all of the properties of an existing subscription identified by {subscriptionId}
		PATCH	Modify some of the properties of an existing subscription identified by {subscriptionId}
		DELETE	Delete a subscription identified by {subscriptionId}

5.11.1.2 Resource: Service Parameter Subscriptions

5.11.1.2.1 Introduction

This resource allows a AF to read all active Service Parameter Subscriptions for the given AF, or create a new individual service parameter subscription in the NEF.

5.11.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-service-parameter/v1/{afld}/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	P	Cardinality	Description	Applicability
gpsi	array(Gpsi)	O	0..N	The GPSI of the requested UE(s).	EnNB
ip-addr	array(IpAddr)	O	0..N	The IP address(es) of the requested UE(s).	EnNB
ip-domain	string	O	0..1	The IPv4 address domain identifier. The attribute may only be provided if IPv4 address is included in the ip-addr query parameter.	EnNB
mac-addr	array(MacAddr48)	O	0..N	The MAC address(es) of the requested UE(s).	EnNB

This method shall support the request data structures specified in table 5.11.1.2.3.2-2 and the response data structures and response codes specified in table 5.11.1.2.3.2-3.

Table 5.11.1.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.11.1.2.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.11.1.2.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.11.1.2.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.11.1.2.3.3 POST

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

This method shall support the request data structures specified in table 5.11.1.2.3.3-1 and the response data structures and response codes specified in table 5.11.1.2.3.3-2.

Table 5.11.1.2.3.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ServiceParameterData	M	1	Parameters to create a service parameter subscription resource.

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

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

Table 5.11.1.2.3.3-3: Headers supported by the 201 Response Code on this resource

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

5.11.1.3 Resource: Individual Service Parameter Subscription

5.11.1.3.1 Introduction

This resource allows a AF to read, update or delete an existing service parameter subscription.

5.11.1.3.2 Resource Definition

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

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

Table 5.11.1.3.2-1: Resource URI variables for this resource

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

5.11.1.3.3 Resource Methods

5.11.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.11.1.3.3.

5.11.1.3.3.2 GET

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

This method shall support the URI query parameters specified in table 5.11.1.3.3.2-1.

Table 5.11.1.3.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.11.1.3.3.2-2 and the response data structures and response codes specified in table 5.11.1.3.3.2-3.

Table 5.11.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.11.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.11.1.3.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.11.1.3.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.11.1.3.3.3 PUT

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

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

Table 5.11.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
ServiceParameter Data	M	1	Modify an existing subscription.

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

Data type	P	Cardinality	Response codes	Description
ServiceParameter Data	M	1	200 OK	The subscription resource was updated successfully.

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

Table 5.11.1.3.3.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.11.1.3.3.3-4: Headers supported by the 308 Response Code on this resource

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

5.11.1.3.3.4 DELETE

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

This method shall support the URI query parameters specified in table 5.11.1.3.3.4-1.

Table 5.11.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.11.1.3.3.4-2 and the response data structures and response codes specified in table 5.11.1.3.3.4-3.

Table 5.11.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.11.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

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

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

Table 5.11.1.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.11.1.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.11.1.3.3.5 PATCH

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

This method shall support the request data structures specified in table 5.11.1.3.3.5-1 and the response data structures and response codes specified in table 5.11.1.3.3.5-2.

Table 5.11.1.3.3.5-1: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
ServiceParameter DataPatch	M	1	Partial update an existing subscription.

Table 5.11.1.3.3.5-2: Data structures supported by the PATCH Response Body on this resource

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

Table 5.11.1.3.3.5-3: Headers supported by the 307 Response Code on this resource

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

Table 5.11.1.3.3.5-4: Headers supported by the 308 Response Code on this resource

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

5.11.1A Notifications

5.11.1A.1 Introduction

Upon NEF notify a Service Parameter Authorization Update (e.g. to revoke an authorization) to AF, or forward a notification event related to invocation of service parameter provisioning, e.g. the notification of outcome of UE Policies Delivery to AF, the NEF shall send an HTTP POST message including the notified 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 5.11.1A.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
AF Notifications	{notificationDestination}	POST	The notification of service parameter authorization updates and/or notification event related to the result of invocation of service parameter provisioning.

5.11.1A.2 AF Notifications

5.11.1A.2.1 Description

The AF Notifications are used by the NEF to send the Service Parameter Authorization Update (e.g. to revoke an authorization) to the AF, and/or to send AF subscribed event notification of the outcome related to the invocation of service parameter provisioning to the AF.

5.11.1A.2.2 Target URI

The Callback URI "{notificationDestination}" shall be used with the callback URI variables defined in table 5.11.1A.2.2-1.

Table 5.11.1A.2.2-1: Callback URI variables

Name	Data type	Definition
notificationDestination	Link	Callback reference provided by the AF during creation of the subscription within the ServiceParameterData data type as defined in Table 5.11.2.3.2-1.

5.11.1A.3 Operation Definition

5.11.1A.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.11.1A.3.1-1 and the response data structure with response codes specified in table 5.11.1A.3.1-2.

Table 5.11.1A.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
array(AfNotification)	M	1..N	Notifications upon AF Service Parameter Authorization Update, and/or AF subscribed event notification of the outcome related to the invocation of service parameter provisioning.

Table 5.11.1A.3.1-2: Data structures supported by the POST Response Body on this resource

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

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

Table 5.11.1A.3.1-3: Headers supported by the 307 Response Code on this resource

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

Table 5.11.1A.3.1-4: Headers supported by the 308 Response Code on this resource

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

5.11.1A.3.2 Notification via Websocket

If supported by both AF and NEF and successfully negotiated, the AF subscribed outcome event notification related to the invocation of service parameter provisioning may alternatively be delivered through the Websocket mechanism as defined in subclause 5.2.5.4 of 3GPP TS 29.122 [4].

Table 5.11.1A.3.2-1: Headers supported by the 307 Response Code on this resource

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

Table 5.11.1A.3.2-2: Headers supported by the 308 Response Code on this resource

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

5.11.2 Data Model

5.11.2.1 General

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

Table 5.11.2.1-1 specifies the data types defined for the ServiceParameter API.

Table 5.11.2.1-1: ServiceParameter API specific Data Types

Data type	Clause defined	Description	Applicability
ConnectionCapabilities	5.11.2.4.6	UE application requests a network connection with certain capabilities.	AfGuideURSP
ParameterOverPc5	5.11.2.4.2	Represents configuration parameters for V2X communications over PC5 reference point.	
ParameterOverPc5Rm	5.11.2.4.2	Represents the same as the ParameterOverPc5 data type but with the "nullable: true" property.	
ParameterOverUu	5.11.2.4.2	Represents configuration parameters for V2X communications over Uu reference point.	
ParameterOverUuRm	5.11.2.4.2	Represents the same as the ParameterOverUu data type but with the "nullable: true" property.	
ParamForProSeDc	5.11.2.4.2	Represents the service parameters for 5G ProSe direct communications.	ProSe
ParamForProSeDcRm	5.11.2.4.2	This data type is defined in the same way as the ParamForProSeDc data type, but with the OpenAPI nullable property set to true.	ProSe
ParamForProSeDd	5.11.2.4.2	Represents the service parameters for 5G ProSe direct discovery.	ProSe
ParamForProSeDdRm	5.11.2.4.2	This data type is defined in the same way as the ParamForProSeDd data type, but with the OpenAPI nullable property set to true.	ProSe
ParamForProSeRemUe	5.11.2.4.2	Represents the service parameters for 5G ProSe remote UE.	ProSe
ParamForProSeRemUeRm	5.11.2.4.2	This data type is defined in the same way as the ParamForProSeRemUe data type, but with the OpenAPI nullable property set to true.	ProSe
ParamForProSeU2NRelUe	5.11.2.4.2	Represents the service parameters for 5G ProSe UE-to-network relay UE.	ProSe
ParamForProSeU2NRelUeRm	5.11.2.4.2	This data type is defined in the same way as the ParamForProSeU2NRelUe data type, but with the OpenAPI nullable property set to true.	ProSe
RouteSelectionParameterSet	5.11.2.3.5	Contains parameters that can be used to guide the Route Selection Descriptors of the URSP.	AfGuideURSP
ServiceParameterData	5.11.2.3.2	Represents an individual Service Parameter subscription resource.	
ServiceParameterDataPatch	5.11.2.3.3	Represents the parameters to request the modification of a service parameter subscription resource.	
TrafficDescriptorComponents	5.11.2.3.8	Traffic descriptor components for the requested URSP.	AfGuideURSP
UrspRuleRequest	5.11.2.3.4	Contains parameters that can be used to guide the URSP.	AfGuideURSP

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
AppDescriptor	Clause 5.7.2.3.4	Application descriptor describes the operation systems and the corresponding applications for each operation systems.
Dnn	3GPP TS 29.571 [8]	Identifies a DNN.
EthFlowDescription	3GPP TS 29.514 [7]	Defines a packet filter for an Ethernet flow.
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user group.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
IpAddr	3GPP TS 29.571 [8]	UE IP Address.
IPv4Addr	3GPP TS 29.571 [8]	Identifies an IPv4 address.
IPv6Addr	3GPP TS 29.571 [8]	Identifies an IPv6 address.
Link	3GPP TS 29.122 [4]	
MacAddr48	3GPP TS 29.571 [8]	Identifies an MAC address.
MtcProviderInformation	3GPP TS 29.571 [8]	Indicates MTC provider information.
Snsai	3GPP TS 29.571 [8]	Identifies the S-NSSAI.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.11.3-1.
Tai	3GPP TS 29.571 [8]	Tracking Area Identity information.
UInteger	3GPP TS 29.571 [8]	Unsigned integer.

5.11.2.3 Structured data types

5.11.2.3.1 Introduction

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

5.11.2.3.2 Type: ServiceParameterData

Table 5.11.2.3.2-1: Definition of type ServiceParameterData

Attribute name	Data type	P	Cardinality	Description	Applicability
self	Link	C	0..1	Identifies the individual service parameter subscription resource URI. Shall be present by the NEF in HTTP responses that include an object of ServiceParameterData type.	
dnn	Dnn	O	0..1	Identifies a DNN. (NOTE 2) (NOTE 3)	
snssai	Snssai	O	0..1	Identifies an S-NSSAI. (NOTE 2) (NOTE 3)	
afServiceId	string	O	0..1	Identifies a service on behalf of which the AF is issuing the request. (NOTE 2) (NOTE 3)	
appld	string	O	0..1	Identifies an application identifier. (NOTE 2)	
gpsi	Gpsi	O	0..1	Identifies GPSI. (NOTE 1)	
ueIpv4	Ipv4Addr	O	0..1	The IPv4 address of the served UE. (NOTE 1)	
ueIpv6	Ipv6Addr	O	0..1	The IPv6 address of the served UE. (NOTE 1)	
ueMac	MacAddr48	O	0..1	The MAC address of the served UE. (NOTE 1)	
exterGroupId	ExternalGroupId	O	0..1	Represents a group of users. (NOTE 1)	
anyUeInd	boolean	O	0..1	Identifies whether the service parameters apply to any UE. This attribute shall set to "true" if applicable for any UE, otherwise, set to "false". (NOTE 1) (NOTE 3)	
subNotifEvents	array(Event)	O	1..N	Identifies the AF subscribed event(s) notifications related to AF provisioned service parameters.	AfNotifications
notificationDestination	Uri	C	0..1	Contains the callback URI to receive the notifications from the NEF. Shall be present if "subNotifEvents" attribute is included.	AfNotifications
requestTestNotification	boolean	O	0..1	Set to true by the AF to request the NEF to send a test notification as defined in subclause 5.2.5.3 of 3GPP TS 29.122 [4]. Set to false or omitted otherwise.	Notification_test_event
websocketNotifConfig	WebsocketNotifConfig	O	0..1	Configuration parameters to set up notification delivery over WebSocket protocol.	Notification_websocket
paramOverPc5	ParameterOverPc5	O	0..1	Contains the V2X service parameters used over PC5	
paramOverUu	ParameterOverUu	O	0..1	Contains the V2X service parameters used over Uu	
paramForProSeDd	ParamForProSeDd	O	0..1	Contains the service parameters for 5G ProSe direct discovery.	ProSe
paramForProSeDc	ParamForProSeDc	O	0..1	Contains the service parameters for 5G ProSe direct communications.	ProSe
paramForProSeU2NRelUe	ParamForProSeU2NRelUe	O	0..1	Contains the service parameters for 5G ProSe UE-to-network relay UE.	ProSe
paramForProSeRemUe	ParamForProSeRemUe	O	0..1	Contains the service parameters for 5G ProSe remote UE.	ProSe
urspGuidance	array(UrspRuleRequest)	O	1..N	Contains the service parameter used to guide the URSP.	AfGuideURSP
mtcProviderId	MtcProviderInformation	O	0..1	Indicates MTC provider information.	

supFeat	SupportedFeatures	C	0..1	Indicates the list of Supported features used as described in subclause 5.11.3. This attribute shall be provided in the POST request and in the response of successful resource creation.	
<p>NOTE 1: One of individual UE identifier (i.e. "gpsi", "uelpv4", "uelpv6" or "ueMac" attribute), External Group Identifier (i.e. "exterGroupld" attribute) or any UE indication (i.e. "anyUeInd" attribute) shall be included. For V2X and URSP service parameter provisioning (see clause 4.4.20), only "anyUeInd", "gpsi" and "exterGroupld" attributes are applicable.</p> <p>NOTE 2: Either the "afServiceId" attribute, "appld" attribute or the combination of "snssai" and "dnn" attributes shall be provided. When the feature "AfGuideURSP" is supported, only the "afServiceId" attribute shall be provided for providing guidance for URSP determination.</p> <p>NOTE 3: When "anyUeInd" attribute is present, "appld" attribute, "afServiceId" attribute or the combination of "snssai" attribute and "dnn" attribute shall be provided. When the feature "AfGuideURSP" is supported, only the "afServiceId" attribute shall be provided for providing guidance for URSP determination.</p>					

5.11.2.3.3 Type: ServiceParameterDataPatch

Table 5.11.2.3.3-1: Definition of type ServiceParameterDataPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
paramOverPc5	ParameterOverPc5Rm	O	0..1	Contains the V2X service parameters used over PC5	
paramOverUu	ParameterOverUuRm	O	0..1	Contains the V2X service parameters used over Uu	
paramForProSeDd	ParamForProSeDdRm	O	0..1	Contains the service parameters for 5G ProSe direct discovery.	ProSe
paramForProSeDc	ParamForProSeDcRm	O	0..1	Contains the service parameters for 5G ProSe direct communications.	ProSe
paramForProSeU2NRelUE	ParamForProSeU2NRelUeRm	O	0..1	Contains the service parameters for 5G ProSe UE-to-network relay UE.	ProSe
paramForProSeRemote	ParamForProSeRemUeRm	O	0..1	Contains the service parameters for 5G ProSe remote UE.	ProSe
urspGuidance	array(UrspRuleRequest)	O	1..N	Contains the service parameter used to guide the URSP.	AfGuideURSP
subNotifEvents	array(Event)	O	1..N	Identifies the AF subscribed event(s) notifications related to AF provisioned service parameters.	AfNotifications
notificationDestination	Uri	O	0..1	Contains the callback URI to receive the notifications from the NEF. May be present If "subNotifEvents" attribute is included.	AfNotifications

5.11.2.3.4 Type: UrspRuleRequest

Table 5.11.2.3.4-1: Definition of type UrspRuleRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
trafficDesc	TrafficDescriptorComponents	O	0..1	Traffic descriptor components for the requested URSP. (NOTE 1)	
routeSelParamSets	array(RouteSelectionParameterSet)	O	1..N	Route Selection Parameter Sets, i.e. sets of parameters that may be used to guide the Route Selection Descriptors of the URSP. (NOTE 2)	
NOTE 1: if "trafficDesc" attribute is not present, the NEF may derive the traffic descriptor components from the AF Identifier.					
NOTE 2: if "routeSelParamSets" attribute is not present, the NEF may derive S-NSSAI/DNN and/or other related parameters from AF Identifier according to SLA.					

5.11.2.3.5 Type: RouteSelectionParameterSet

Table 5.11.2.3.5-1: Definition of type RouteSelectionParameterSet

Attribute name	Data type	P	Cardinality	Description	Applicability
dnn	Dnn	O	0..1	DNN to be matched with the DNN of the PDU Session.	
snssai	Snssai	O	0..1	S-NSSAI to be matched with the S-NSSAI of the PDU Session.	
precedence	UInteger	O	0..1	Determines the order in which the Route Selection Descriptors are to be applied.	
spatialValidity	array(string)	O	1..N	Indicates where the route selection parameters apply. It may correspond to a geographical area (e.g. a geographic zone identifier that is known to the AF and is configured by the operator to correspond to a list of TAIs).	
spatialValidityTais	array(Tai)	O	1..N	Indicates the TAIs in which the route selection parameters apply. This attribute is applicable only within the 5GC and it shall not be included in the request messages of untrusted AFs for URSP guidance.	

5.11.2.3.6 Type: AfNotification

Table 5.11.2.3.6-1: Definition of type AfNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
subscription	Link	M	1	Link to the subscription resource to which this notification is related.	
reportEvent	Event	C	0..1	Identifies the reported event notification. May be present if the subNotifEvent attribute is included in the AF subscription transaction. (NOTE)	
authResult	AuthorizationResult	C	0..1	Indicates the service parameters authorization update result. (e.g. to revoke an authorization). (NOTE)	
gpsi	Gpsi	C	0..1	Identifies the GPSI of the reported UE. Shall be present with the same value if the gpsi attribute is included in the AF subscription transaction.	
dnn	Dnn	O	0..1	Identifies a DNN.	
snsai	Snsai	O	0..1	Identifies an S-NSSAI.	
eventInfo	EventInfo	O	0..1	Indicates the event information.	
NOTE: At least one of "reportEvent" attribute and "authResult" attribute shall be included.					

Editor's Note: It is FFS whether to add "exterGroupId" attribute and "anyUeInd" attribute according to TS 23.502, clause 5.2.6.11.6.

5.11.2.3.7 Type: EventInfo

Table 5.11.2.3.7-1: Definition of type AfEventInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
failureCause	Failure	O	0..1	Identify the failure reason for an unsuccessful result. May present if the reportEvent attribute value is "UNSUCCESS_UE_POL_DEL_SP".	

5.11.2.3.8 Type: TrafficDescriptorComponents

Table 5.11.2.3.8-1: Definition of type TrafficDescriptorComponents

Attribute name	Data type	P	Cardinality	Description	Applicability
appDescs	map(AppDescriptor)	C	1..N	Describes the operation systems and the corresponding applications for each operation systems. The key of map is osId. (NOTE 2)	
flowDescs	array(string)	C	1..N	Destination IP 3 tuple(s) (IP address or IPv6 network prefix, port number, protocol ID of the protocol above IP). The content of the string has the same encoding as the IPFilterRule AVP value as defined in IETF RFC 6733 [54], applicable only to the destination IP 3 tuple(s). (NOTE 3)	
domainDescs	array(string)	C	1..N	FQDN(s) or a regular expression which are used as a domain name matching criteria. (NOTE 4)	
ethFlowDescs	array(EthFlowDescription)	C	1..N	Descriptor(s) for destination information of non-IP traffic in which only ethernet flow description is defined. (NOTE 3)	
dnns	array(Dnn)	C	1..N	This is matched against the DNN information provided by the application.	
connCaps	array(ConnectionCapabilities)	C	1..N	This is matched against the information provided by a UE application when it requests a network connection with certain capabilities.	
NOTE 1: At least one attribute of the above Traffic descriptor components shall be present.					
NOTE 2: The information is used to identify the Application(s) that is(are) running on the UE's OS. The OSId does not include an OS version number. The OSAppId does not include a version number for the application.					
NOTE 3: "flowDescs" attribute and "ethFlowDescs" attribute are mutually exclusive.					
NOTE 4: The match of this traffic descriptor component does not require successful DNS resolution of the FQDN provided by the UE Application.					

5.11.2.4 Simple data types and enumerations

5.11.2.4.1 Introduction

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

5.11.2.4.2 Simple data types

The simple data types defined in table 5.11.2.4.2-1 shall be supported.

Table 5.11.2.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
ParameterOverPc5	string	Configuration parameters for V2X communication over PC5. Its encoding shall comply with the UE policies for V2X communication over PC5 as defined in subclause 5.3 of 3GPP TS 24.588 [33].	
ParameterOverPc5Rm	string	This data type is defined in the same way as the "ParameterOverPc5" data type, but with the OpenAPI "nullable: true" property.	
ParameterOverUu	string	Configuration parameters for V2X communication over Uu. Its encoding shall comply with the UE policies for V2X communication over Uu as defined in subclause 5.4 of 3GPP TS 24.588 [33].	
ParameterOverUuRm	string	This data type is defined in the same way as the "ParameterOverUu" data type, but with the OpenAPI "nullable: true" property.	
ParamForProSeDd	string	Configuration parameters for 5G ProSe direct discovery. Its encoding shall comply with the UE policies for 5G ProSe direct discovery defined in subclause 5.3 of 3GPP TS 24.555 [49].	ProSe
ParamForProSeDdRm	string	This data type is defined in the same way as the "ParamForProSeDd" data type, but with the OpenAPI "nullable: true" property.	ProSe
ParamForProSeDc	string	Configuration parameters for 5G ProSe direct communications. Its encoding shall comply with the UE policies for 5G ProSe direct communications defined in subclause 5.4 of 3GPP TS 24.555 [49].	ProSe
ParamForProSeDcRm	string	This data type is defined in the same way as the "ParamForProSeDc" data type, but with the OpenAPI "nullable: true" property.	ProSe
ParamForProSeU2NRelUe	string	Configuration parameters for 5G ProSe UE-to-network relay UE. Its encoding shall comply with the UE policies for 5G ProSe UE-to-network relay UE defined in subclause 5.5 of 3GPP TS 24.555 [49].	ProSe
ParamForProSeU2NRelUeRm	string	This data type is defined in the same way as the "ParamForProSeU2NRelUe" data type, but with the OpenAPI "nullable: true" property.	ProSe
ParamForProSeRemUe	string	Configuration parameters for 5G ProSe remote UE. Its encoding shall comply with the UE policies for 5G ProSe remote UE defined in subclause 5.6 of 3GPP TS 24.555 [49].	ProSe
ParamForProSeRemUeRm	string	This data type is defined in the same way as the "ParamForProSeRemUe" data type, but with the OpenAPI "nullable: true" property.	ProSe

5.11.2.4.3 Enumeration: Event

Table 5.11.2.4.3-1: Enumeration Event

The enumeration Event represents the AF subscribe to event notification of the outcome related to the invocation of AF provisioned service parameters.

Enumeration value	Description
SUCCESS_UE_POL_DEL_SP	Successful UE Policy Delivery related to the invocation of AF provisioned Service Parameters.
UNSUCCESS_UE_POL_DEL_SP	Unsuccessful UE Policy Delivery related to the invocation of AF provisioned Service Parameters.

5.11.2.4.4 Enumeration: AuthorizationResult

The enumeration AuthorizationResult represents the NEF notify the AF about the service parameters authorization updates result, e.g. to revoke an authorization.

Table 5.11.2.4.4-1: Enumeration AuthorizationResult

Enumeration value	Description
AUTH_REVOKED	Indicated the service parameters authorization is revoked.

5.11.2.4.5 Enumeration: Failure

The enumeration FailureCause represents the failure reason for the unsuccessful result.

Table 5.11.2.4.5-1: Enumeration Failure

Enumeration value	Description
UNSPECIFIED	Indicates the PCF received the UE sent UE policy delivery service cause #111 (Protocol error, unspecified).
UE_NOT_REACHABLE	Indicates the PCF received the notification from the AMF that the UE is not reachable.
UNKNOWN	Indicates unknown reasons upon no response from the UE, e.g. UPDS message type is not defined or not implemented by the UE, or not compatible with the UPDS state, in which the UE shall ignore the UPDS message.

5.11.2.4.6 Enumeration: ConnectionCapabilities

The enumeration ConnectionCapabilities represents the information provided by a UE application when it requests a network connection with certain capabilities.

Table 5.11.2.4.6-1: Enumeration ConnectionCapabilities

Enumeration value	Description
IMS	Indicates the connection capability to support IMS service.
MMS	Indicates the connection capability to support MMS service.
SUPL	Indicates the connection capability to support SUPL service.
Internet	Indicates the connection capability to support Internet service.

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
1	ProSe	This feature indicates the support of UE policy and N2 information provisioning for 5G ProSe.
2	enNB	Indicates the support of enhancements to the northbound interfaces.
3	AfNotifications	This feature indicates the support of AF subscribed event(s) notifications.
4	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.
5	Notification_test_event	The testing of notification connection is supported as described in 3GPP TS 29.122 [4].

5.12 ACSPParameterProvision API

5.12.1 Resources

5.12.1.1 Overview

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

{apiRoot}/3gpp-ac-s-pp/v1

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

This subclause describes the structure for the Resource URIs as shown in figure 5.12.1.1-1 and the resources and HTTP methods used for the ACSPParameterProvision API.

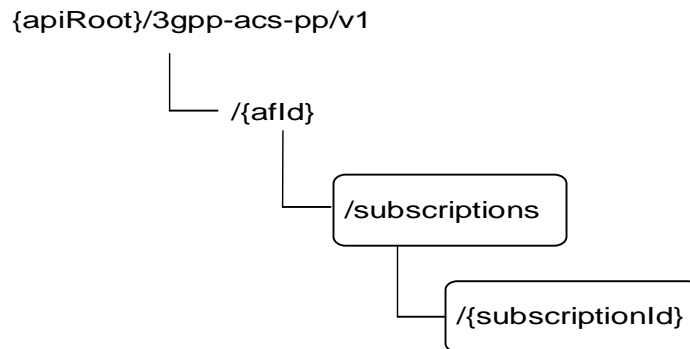


Figure 5.12.1.1-1: Resource URI structure of the ACSPParameterProvision API

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

Table 5.12.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
ACS Configuration Subscriptions	/{afId}/subscriptions	GET	Read all subscriptions for a given AF.
		POST	Create a new ACS configuration subscription.
Individual ACS Configuration Subscription	/{afId}/subscriptions/{subscriptionId}	GET	Read an existing subscription identified by {subscriptionId}
		PUT	Update all of the properties of an existing subscription identified by {subscriptionId}.
		PATCH	Modify an existing subscription identified by {subscriptionId}.
		DELETE	Delete a subscription identified by {subscriptionId}

5.12.1.2 Resource: ACS Configuration Subscriptions

5.12.1.2.1 Introduction

This resource allows a AF to read all active ACS Configuration Subscriptions for the given AF, or create an new individual ACS Configuration subscription in the NEF.

5.12.1.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-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].
afId	Identifier of the AF of type string.

5.12.1.2.3 Resource Methods

5.12.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.12.1.2.3.

5.12.1.2.3.2 GET

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

This method shall support the URI query parameters specified in table 5.12.1.2.3.2-1.

Table 5.12.1.2.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.12.1.2.3.2-2 and the response data structures and response codes specified in table 5.12.1.2.3.2-3.

Table 5.12.1.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.12.1.2.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.12.1.2.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.12.1.2.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.12.1.2.3.3 POST

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

This method shall support the request data structures specified in table 5.12.1.2.3.3-1 and the response data structures and response codes specified in table 5.12.1.2.3.3-2.

Table 5.12.1.2.3.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AcsConfiguration Data	M	1	Parameters to create an individual ACS Configuration subscription resource.

Table 5.12.1.2.3.3-2: Data structures supported by the POST Response Body on this resource

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

Table 5.12.1.2.3.3-3: Headers supported by the 201 Response Code on this resource

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

5.12.1.3 Resource: Individual ACS Configuration Subscription

5.12.1.3.1 Introduction

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

5.12.1.3.2 Resource Definition

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

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

Table 5.12.1.3.2-1: Resource URI variables for this resource

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

5.12.1.3.3 Resource Methods

5.12.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.12.1.3.3.

5.12.1.3.3.2 GET

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

This method shall support the URI query parameters specified in table 5.12.1.3.3.2-1.

Table 5.12.1.3.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.12.1.3.3.2-2 and the response data structures and response codes specified in table 5.12.1.3.3.2-3.

Table 5.12.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.12.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.12.1.3.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.12.1.3.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.12.1.3.3.3 PUT

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

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

Table 5.12.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
AcsConfiguration Data	M	1	Modify an existing subscription.

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

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

Table 5.12.1.3.3.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.12.1.3.3.3-4: Headers supported by the 308 Response Code on this resource

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

5.12.1.3.3.3a PATCH

The PATCH method modifies an existing resource to update an existing ACS Configuration 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 5.9.1.3.3.3a-1 and the response data structures and response codes specified in table 5.9.1.3.3.3a-2.

Table 5.12.1.3.3.3a-1: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
AcsConfiguration DataPatch	M	1	Modify an existing subscription.

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

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

Table 5.12.1.3.3.3a-3: Headers supported by the 307 Response Code on this resource

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

Table 5.12.1.3.3.3a-4: Headers supported by the 308 Response Code on this resource

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

5.12.1.3.3.4 DELETE

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

This method shall support the URI query parameters specified in table 5.12.1.3.3.4-1.

Table 5.12.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.12.1.3.3.4-2 and the response data structures and response codes specified in table 5.12.1.3.3.4-3.

Table 5.12.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.12.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

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

Table 5.12.1.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.12.1.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.12.2 Data Model

5.12.2.1 General

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

Table 5.12.2.1-1 specifies the data types defined for the ACSParameterProvision API.

Table 5.12.2.1-1: ACSParameterProvision API specific Data Types

Data type	Clause defined	Description	Applicability
AcsConfigurationData	5.12.2.3.2	Represents an individual ACS Configuration subscription resource.	
AcsConfigurationDataPatch	5.12.2.3.3	Represents the parameters to request to modify an existing ACS Configuration subscription.	PatchUpdate

5.12.2.2 Reused data types

The data types reused by the ACSParameterProvision API from other specifications are listed in table 5.12.2.2-1.

Table 5.12.2.2-1: Re-used Data Types

Data type	Reference	Comments
AcsInfo	3GPP TS 29.571 [8]	Contains the information of ACS
ExternalGroupld	3GPP TS 29.122 [4]	External Group Identifier for a user group.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
Link	3GPP TS 29.122 [4]	
MtcProviderInformation	3GPP TS 29.571 [8]	Indicates MTC provider information.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.9.4-1.

5.12.2.3 Structured data types

5.12.2.3.1 Introduction

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

5.12.2.3.2 Type: AcsConfigurationData

Table 5.12.2.3.2-1: Definition of type AcsConfigurationData

Attribute name	Data type	P	Cardinality	Description	Applicability
self	Link	C	0..1	Identifies the individual service parameter subscription resource URI. Shall be present by the NEF in HTTP responses that include an object of AcsConfigurationData Data type.	
gpsi	Gpsi	O	0..1	Identifies GPSI. (NOTE)	
exterGroupld	ExternalGroupld	O	0..1	Represents a group of users. (NOTE)	
acsInfo	AcsInfo	M	1	Contains the information of ACS.	
mtcProviderld	MtcProviderInformation	O	0..1	Indicates MTC provider information.	
supFeat	SupportedFeatures	M	1	Indicates the list of Supported features used as described in subclause 5.12.3. This parameter shall be supplied by the NF service consumer in the POST request that requested the creation of an individual ACS configuration Subscription resource.	
NOTE: Only one of the "gpsi" or "exterGroupld" attribute shall be provided.					

5.12.2.3.3 Type: AcsConfigurationDataPatch

Table 5.12.2.3.3-1: Definition of type AcsConfigurationDataPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
acsInfo	AcsInfo	O	0..1	Contains the information of ACS.	
mtcProviderld	MtcProviderInformation	O	0..1	Indicates MTC provider information.	

5.12.2.4 Simple data types and enumerations

5.12.2.4.1 Introduction

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

5.12.2.4.2 Simple data types

The simple data types defined in table 5.12.2.4.2-1 shall be supported.

Table 5.12.2.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.12.3 Used Features

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

Table 5.12.3-1: Features used by ACSParameterProvision API

Feature number	Feature Name	Description
1	PatchUpdate	Indicates the support of enhancements to the northbound interfaces (e.g. support the partial modification of an existing subscription resource).

5.13 MoLcsNotify API

5.13.1 Resources

There is no resource defined for this API.

5.13.2 Notifications

5.13.2.1 Introduction

Upon receipt of a UE location information update notification from the GMLC, the NEF shall send an HTTP POST message in order to notify the AF of the updated UE location information.

5.13.2.2 Event Notification

Callback URI: **{notificationDestination}** shall be used with the callback URI variables defined in table 5.13.2.2-1.

Table 5.13.2.2-1: Callback URI variables

Name	Definition
notificationDestination	A URI indicating the notification destination where N33 notification requests shall be delivered to. This URI shall be preconfigured in the NEF.

5.13.2.3 Operation Definition

5.13.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.13.2.3.1-1 and the response data structures and response codes specified in table 5.13.2.3.1-2.

Table 5.13.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
LocUpdateData	M	1	Delivers UE location to AF during MO-LR procedure

Table 5.13.2.3.1-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
LocUpdateDataReply	M	1	200 OK	The notification is received successfully.
N/A			307 Temporary Redirect	Temporary redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.13.2.3.1-3: Headers supported by the 307 Response Code on this resource

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

Table 5.13.2.3.1-4: Headers supported by the 308 Response Code on this resource

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

5.13.3 Data Model

5.13.3.1 General

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

5.13.3.2 Reused data types

The data types reused by the MoLcsNotify API from other specifications are listed in table 5.13.3.2-1.

Table 5.13.3.2-1: Re-used Data Types

Data type	Reference	Comments
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.13.4-1.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
LocationInfo	3GPP TS 29.122 [4]	Represent user location information for exposure.
LcsQosClass	3GPP TS 29.572 [34]	LCS QoS Class.
ServiceIdentity	3GPP TS 29.515 [35]	Service identity

5.13.3.3 Structured data types

5.13.3.3.1 Introduction

This clause defines the structured data types to be used by the MoLcsNotify API.

5.13.3.3.2 Type: LocUpdateData

This type represents a UE updated location information from the NEF to the AF.

Table 5.13.3.3.2-1: Definition of type LocUpdateData

Attribute name	Data type	P	Cardinality	Description	Applicability
gpsi	Gpsi	M	1	Generic Public Subscription identifier	
locInfo	LocationInfo	M	1	Represent user location information for exposure.	
lcsQosClass	LcsQosClass	M	1	LCS QoS Class.	
svclId	ServiceIdentity	O	0..1	Service Identity may be specified by the UE for LCS request.	
suppFeat	SupportedFeatures	M	1	Indicates the list of Supported features used as described in subclause 5.13.4.	

5.13.3.3.3 Type: LocUpdateDataReply

This data type represents a reply to a MO LCS notification and is sent from the AF to the NEF.

Table 5.13.3.3.3-1: Definition of type LocUpdateDataReply

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

5.13.3.4 Simple data types and enumerations

5.13.3.4.1 Introduction

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

5.13.3.4.2 Simple data types

The simple data types defined in table 5.13.3.4.2-1 shall be supported.

Table 5.13.3.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.13.4 Used Features

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

Table 5.13.4-1: Features used by MoLcsNotify API

Feature number	Feature Name	Description

5.14 AKMA API

5.14.1 Introduction

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

{apiRoot}/3gpp-akma/v1

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

5.14.2 Resources

There are no resources defined for this API in this release of the specification.

5.14.3 Custom Operations without associated resources

5.14.3.1 Overview

The structure of the custom operation URIs of the AKMA API is shown in Figure 5.14.3.1-1.

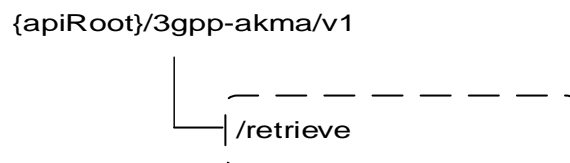


Figure 5.14.3.1-1: Custom operation URI structure of the AKMA API

Table 5.14.3.1-1 provides an overview of the custom operations and applicable HTTP methods.

Table 5.14.3.1-1: Custom operations without associated resources

Operation name	Custom operation URI	Mapped HTTP method	Description
Retrieve	/retrieve	POST	Request to retrieve AKMA Application Key information

5.14.3.2 Operation: Retrieve

5.14.3.2.1 Description

The custom operation allows a service consumer to retrieve AKMA application key information via the NEF.

5.14.3.2.2 Operation Definition

This operation shall support the request and response data structures and response codes specified in tables 5.14.3.2.2-1 and 5.14.3.2.2-2.

Table 5.14.3.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AkmaAfKeyRequest	M	1	Parameters to request to retrieve AKMA Application Key information.

Table 5.14.3.2.2-2: Data structures supported by the POST Response Body on this resource

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

Table 5.14.3.2.2-3: Headers supported by the 307 Response Code on this resource

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

Table 5.14.3.2.2-4: Headers supported by the 308 Response Code on this resource

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

5.14.4 Notifications

Notifications are not applicable to this API.

5.14.5 Data Model

5.14.5.1 General

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

5.14.5.2 Reused data types

The data types reused by the AKMA API from other specifications are listed in table 514.5.2-1.

Table 5.14.5.2-1: Re-used Data Types

Data type	Reference	Comments
DateTime	3GPP TS 29.122 [4]	
Gpsi	3GPP TS 29.571 [8]	
Supi	3GPP TS 29.571 [8]	
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features.

5.14.5.3 Structured data types

5.14.5.3.1 Introduction

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

5.14.5.3.2 Type: AkmaAfKeyRequest

Table 5.14.5.3.2-1: Definition of type AkmaAfKeyRequest

Attribute name	Data type	P	Cardinality	Description	Applicability (NOTE)
afId	AfId	M	1	Identification of AF	
aKId	AKId	M	1	A-KID	
suppFeat	SupportedFeatures	O	0..1	Indicates the list of Supported features used as described in subclause 5.14.6.	
NOTE:	Properties marked with a feature as defined in subclause 5.14.6 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.				

5.14.5.3.3 Type: AkmaAfKeyData

Table 5.14.5.3.3-1: Definition of type AkmaAfKeyData

Attribute name	Data type	P	Cardinality	Description	Applicability (NOTE)
kaf	string	M	1	K _{AF}	
expiry	DateTime	M	1	Expiration time of K _{AF} .	
gpsi	Gpsi	O	0..1	Indicates an external ID or an MSISDN of the UE.	
supi	Supi	C	0..1	Indicates the SUPI of the UE.	
suppFeat	SupportedFeatures	O	0..1	Indicates the features supported by both the AF and the NEF.	
NOTE 1:	Properties marked with a feature as defined in subclause 5.14.6 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:	When the "AkmaAfKeyData" data structure is used in the current release of this specification, the "gpsi" attribute may be included and the "supi" attribute is not applicable.				

5.14.5.4 Simple data types and enumerations

5.14.5.4.1 Introduction

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

5.14.5.4.2 Simple data types

The simple data types defined in table 5.14.5.4.2-1 shall be supported.

Table 5.14.5.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
AfId	string	Identification of AF which is formatted as the following string: "<FQDN>.<Ua* security protocol id>", wherein, <FQDN> is the FQDN of the AF and <Ua* security protocol id> is the identification of the Ua* security protocol specified as Ua security protocol identifier in Annex H of 3GPP TS 33.220 [39] that the AF will use with the UE.	
AKId	string	AKMA Key Identifier shall be in NAI format as specified in subclause 2.2 of IETF RFC 7542 [40], which is formatted as the following string: "<username>@<realm>", wherein, <username> shall include routing identifier and the A-TID, <realm> shall include Home Network Id.	

Editor's Note: The definition of AfId needs to align with CT1.

5.14.6 Used Features

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

Table 5.14.6-1: Features used by AKMA API

Feature number	Feature Name	Description

5.14.7 Error handling

5.14.7.1 General

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

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

5.14.7.2 Protocol Errors

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

5.14.7.3 Application Errors

The application errors defined for the AKMA API are listed in table 5.14.7.3-1.

Table 5.14.7.3-1: Application errors

Application Error	HTTP status code	Description
K_AKMA_NOT_PRESENT	403 Forbidden	Indicates that the K _{AKMA} identified by the A-KID provided in the AKMA Application Key retrieval request body is not present at the AAnF.

5.15 TimeSyncExposure API

5.15.1 Resources

5.15.1.1 Overview

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

{apiRoot}/3gpp-time-sync/v1

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-time-sync" 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 5.15.1.1-1 and the resources and HTTP methods used for the TimeSyncExposure API.

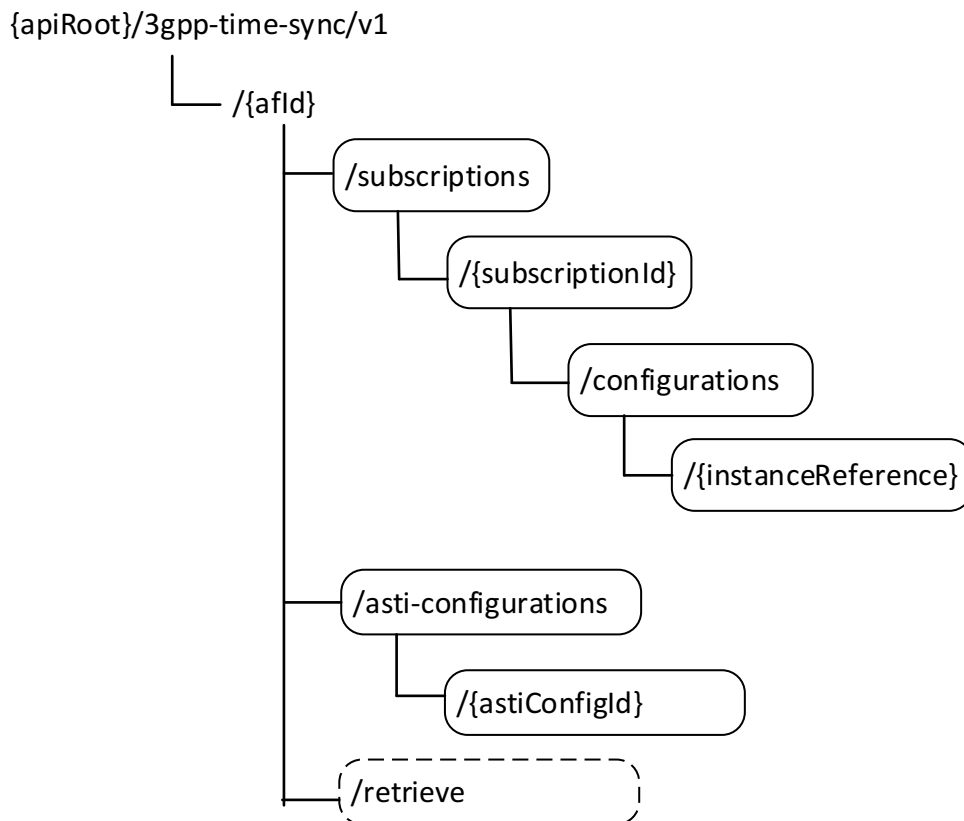


Figure 5.15.1.1-1: Resource URI structure of the TimeSyncExposure API

Table 5.15.1.1-1 provides an overview of the resources and HTTP methods applicable for the TimeSyncExposure API.

Table 5.15.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
Time Synchronization Exposure Subscriptions	/{afld}/subscriptions	GET	Read all subscriptions for a given AF
		POST	Create a new subscription to time synchronization exposure
Individual Time Synchronization Exposure Subscription	/{afld}/subscriptions/{subscriptionId}	GET	Read a subscription to time synchronization exposure
		PUT	Modify all of the properties of an existing subscription to time synchronization exposure
		DELETE	Delete a subscription to time synchronization exposure
Time Synchronization Exposure Configurations	/{afld}/subscriptions/{subscriptionId}/configurations	GET	Read all configurations for a given AF and subscription
		POST	Create a new configuration to time synchronization exposure
Individual Time Synchronization Exposure Configuration	/{afld}/subscriptions/{subscriptionId}/configurations/{instanceReference}	GET	Read a configuration to time synchronization exposure
		PUT	Modify all of the properties of an existing configuration to time synchronization exposure
		DELETE	Delete a configuration to time synchronization exposure
ASTI Configurations	/{afld}/asti-configurations	GET	Read all configurations of 5G access stratum time distribution for a given AF and subscription.
		POST	Create a new configuration of 5G access stratum time distribution.
		retrieve (POST)	Retrieval of the status of access stratum time distribution for a list of UEs.
Individual ASTI Configuration	/{afld}/asti-configurations/{astiConfigId}	PUT	Modify a new configuration of 5G access stratum time distribution.
		DELETE	DELETE a new configuration of 5G access stratum time distribution.

5.15.1.2 Resource: Time Synchronization Exposure Subscriptions

5.15.1.2.1 Introduction

This resource allows an AF to read all active time synchronization exposure subscriptions for the given AF, or allows an AF to create a new Individual Time Synchronization Exposure Subscription in the NEF.

5.15.1.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-time-sync/v1/{afld}/subscriptions

This resource shall support the resource URI variables defined in table 5.15.1.2.2-1.

Table 5.15.1.2.2-1: 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.

5.15.1.2.3 Resource Methods

5.15.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.15.1.2.2.

5.15.1.2.3.2 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 5.15.1.2.3.2-1.

Table 5.15.1.2.3.2-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 5.15.1.2.3.2-2 and the response data structures and response codes specified in table 5.15.1.2.3.2-3.

Table 5.15.1.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.15.1.2.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.15.1.2.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.15.1.2.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.15.1.2.3.3 POST

The POST method creates a new subscription resource to time synchronization 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 5.15.1.2.3.3-1 and the response data structures and response codes specified in table 5.15.1.2.3.3-2.

Table 5.15.1.2.3.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
TimeSyncExposureSubsc	M	1	Contains the information for the creation of a new Individual Time Synchronization Exposure Subscription resource.

Table 5.15.1.2.3.3-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
TimeSyncExposureSubsc	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 5.15.1.2.3.3-3: Headers supported by the 201 Response Code on this resource

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

5.15.1.3 Resource: Individual Time Synchronization Exposure Subscription

5.15.1.3.1 Introduction

This resource allows an AF to read, update or delete an existing Individual Time Synchronization Exposure Subscription.

5.15.1.3.2 Resource Definition

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

This resource shall support the resource URI variables defined in table 5.15.1.3.2-1.

Table 5.15.1.3.2-1: Resource URI variables for this resource

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

5.15.1.3.3 Resource Methods

5.15.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.15.1.3.2.

5.15.1.3.3.2 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 5.15.1.3.3.2-1.

Table 5.15.1.3.3.2-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 5.15.1.3.3.2-2 and the response data structures and response codes specified in table 5.15.1.3.3.2-3.

Table 5.15.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.15.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.15.1.3.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.15.1.3.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.15.1.3.3.3 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 5.15.1.3.3.3-1 and the response data structures and response codes specified in table 5.15.1.3.3.3-2.

Table 5.15.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
TimeSyncExposureSubsc	M	1	Modify an existing Time Synchronization Exposure Subscription.

Table 5.15.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource

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

Table 5.15.1.3.3.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.15.1.3.3.3-4: Headers supported by the 308 Response Code on this resource

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

5.15.1.3.3.4 DELETE

The DELETE method deletes the time synchronization 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 5.15.1.3.3.4-1.

Table 5.15.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.15.1.3.3.4-2 and the response data structures and response codes specified in table 5.15.1.3.3.4-3.

Table 5.15.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.15.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

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

Table 5.15.1.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.15.1.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.15.1.4 Resource: Time Synchronization Exposure Configurations

5.15.1.4.1 Introduction

This resource allows an AF to read all active time synchronization exposure configuration for the given AF and subscription, or allows an AF to create a new time synchronization configuration and activate the time synchronization service with the configuration.

5.15.1.4.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-time-sync/v1/{afId}/subscriptions/{subscriptionId}/configurations**

This resource shall support the resource URI variables defined in table 5.15.1.4.2-1.

Table 5.15.1.4.2-1: Resource URI variables for this resource

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

5.15.1.4.3 Resource Methods

5.15.1.4.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.15.1.4.3.

5.15.1.4.3.2 GET

The GET method allows to read all active configurations for a given AF and subscription. 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 5.15.1.4.3.2-1.

Table 5.15.1.4.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.15.1.4.3.2-2 and the response data structures and response codes specified in table 5.15.1.4.3.2-3.

Table 5.15.1.4.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.15.1.4.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.15.1.4.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.15.1.4.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.15.1.4.3.3 POST

The POST method creates a new configuration resource to activate time synchronization service 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 5.15.1.4.3.3-1 and the response data structures and response codes specified in table 5.15.1.4.3.3-2.

Table 5.15.1.4.3.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
TimeSyncExposureConfig	M	1	Parameters to create a configuration and to activate time synchronization service.

Table 5.15.1.2.4.3-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
TimeSyncExposureConfig	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 5.15.1.4.3.3-3: Headers supported by the 201 Response Code on this resource

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

5.15.1.5 Resource: Individual Time Synchronization Exposure Configuration

5.15.1.5.1 Introduction

This resource allows an AF to read/modify/cancel a configuration to active/modify/deactivate Time Synchronization service with the NEF.

5.15.1.5.2 Resource Definition

Resource URI: {apiRoot}/3gpp-time-sync/v1/{afId}/subscriptions/{subscriptionId}/configuration/{instanceReference}

This resource shall support the resource URI variables defined in table 5.15.1.5.2-1.

Table 5.15.1.5.2-1: Resource URI variables for this resource

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

5.15.1.5.3 Resource Methods

5.15.1.5.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.15.1.5.2.

5.15.1.5.3.2 GET

The GET method allows to read the active configuration for a given AF, subscription Id and configuration 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 5.15.1.5.3.2-1.

Table 5.15.1.5.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.15.1.5.3.2-2 and the response data structures and response codes specified in table 5.15.1.5.3.2-3.

Table 5.15.1.5.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.15.1.5.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.15.1.5.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.15.1.5.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.15.1.5.3.3 PUT

The PUT method modifies an existing configuration 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 5.15.1.5.3.3-1 and the response data structures and response codes specified in table 5.15.1.5.3.3-2.

Table 5.15.1.5.3.3-1: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
TimeSyncExposureConfig	M	1	Modify an existing Time Synchronization Exposure Configuration.

Table 5.15.1.5.3.3-2: Data structures supported by the PUT Response Body on this resource

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

Table 5.15.1.5.3.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.15.1.5.3.3-4: Headers supported by the 308 Response Code on this resource

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

5.15.1.5.3.4 DELETE

The DELETE method deletes the time synchronization 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 5.15.1.5.3.4-1.

Table 5.15.1.5.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.15.1.5.3.4-2 and the response data structures and response codes specified in table 5.15.1.5.3.4-3.

Table 5.15.1.5.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.15.1.5.3.4-3: Data structures supported by the DELETE Response Body on this resource

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

Table 5.15.1.5.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.15.1.5.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.15.1.6 Resource: ASTI Configurations

5.15.1.6.1 Introduction

This resource allows an AF to read all active configurations of 5G access stratum time distribution for a given AF, or allows an AF to create a new new configuration of 5G access stratum time distribution.

5.15.1.6.2 Resource Definition

Resource URI: `{apiRoot}/3gpp-time-sync/v1/{afId}/asti-configurations`

This resource shall support the resource URI variables defined in table 5.15.1.6.2-1.

Table 5.15.1.6.2-1: Resource URI variables for this resource

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

5.15.1.6.3 Resource Methods

5.15.1.6.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.15.1.6.3.

5.15.1.6.3.2 GET

The GET method allows to read all active configurations of 5G access stratum time distribution for a given AF and subscription. 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 5.15.1.6.3.2-1.

Table 5.15.1.6.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.15.1.6.3.2-2 and the response data structures and response codes specified in table 5.15.1.6.3.2-3.

Table 5.15.1.6.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.15.1.6.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.15.1.6.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.15.1.6.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.15.1.6.3.3 POST

The POST method creates a new configuration of 5G access stratum time distribution 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 5.15.1.6.3.3-1 and the response data structures and response codes specified in table 5.15.1.6.3.3-2.

Table 5.15.1.6.3.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AccessTimeDistributionData	M	1	Parameters to create a configuration of 5G access stratum time distribution.

Table 5.15.1.6.4.3-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AccessTimeDistributionData	M	1	201 Created	The configuration 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 5.15.1.6.3.3-3: Headers supported by the 201 Response Code on this resource

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

5.15.1.6.4 Resource Custom Operations

5.15.1.6.4.1 Overview

Table 5.15.1.6.4.1-1: Custom operations

Operation Name	Custom operation URI	Mapped HTTP method	Description
retrieve	/asti-configurations/retrieve	retrieve (POST)	Request the status of the 5G access stratum time distribution for a list of UEs.

5.15.1.6.4.2 Operation: retrieve

5.15.1.6.4.2.1 Description

This custom operation retrieves the status of the access stratum time distribution for a list of UEs.

5.15.1.6.4.2.2 Operation Definition

This operation shall support the request data structures specified in table 5.15.1.6.4.2.2-1 and the response data structure and response codes specified in table 5.15.1.6.4.2.2-2.

Table 5.15.1.6.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
StatusRequestData	M	1	Parameters to be sent by the NF service consumer when the status of the 5G access stratum time distribution for a list of UEs is requested.

Table 5.15.1.6.4.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
StatusResponseData	M	1	200 OK	Status of the 5G access stratum time distribution for a list of UEs is returned.
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.				

5.15.1.7 Resource: Individual ASTI Configuration

5.15.1.7.1 Introduction

This resource allows an AF to read/modify/cancel a configuration of 5G access stratum time distribution with the NEF.

5.15.1.7.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-time-sync/v1/{afId}/asit-configurations/{astiConfigId}**

This resource shall support the resource URI variables defined in table 5.15.1.7.2-1.

Table 5.15.1.7.2-1: Resource URI variables for this resource

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

5.15.1.7.3 Resource Methods

5.15.1.7.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.15.1.7.2.

5.15.1.7.3.2 GET

The GET method allows to read the active configuration for a given AF, subscription Id and configuration 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 5.15.1.7.3.2-1.

Table 5.15.1.7.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.15.1.7.3.2-2 and the response data structures and response codes specified in table 5.15.1.7.3.2-3.

Table 5.15.1.7.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.15.1.7.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.15.1.7.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.15.1.7.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.15.1.7.3.3 PUT

The PUT method modifies an existing configuration 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 5.15.1.7.3.3-1 and the response data structures and response codes specified in table 5.15.1.7.3.3-2.

Table 5.15.1.7.3.3-1: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
AccessTimeDistributionData	M	1	Modify an existing configuration of 5G access stratum time distribution.

Table 5.15.1.7.3.3-2: Data structures supported by the PUT Response Body on this resource

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

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

Table 5.15.1.7.3.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.15.1.7.3.3-4: Headers supported by the 308 Response Code on this resource

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

5.15.1.7.3.4 DELETE

The DELETE method deletes the configuration of 5G access stratum time distribution 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 5.15.1.7.3.4-1.

Table 5.15.1.7.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.15.1.7.3.4-2 and the response data structures and response codes specified in table 5.15.1.7.3.4-3.

Table 5.15.1.7.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.15.1.7.3.4-3: Data structures supported by the DELETE Response Body on this resource

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

Table 5.15.1.7.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.15.1.7.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.15.2 Custom Operations without associated resources

None.

5.15.3 Notifications

5.15.3.1 Introduction

Table 5.15.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Time Synchronization Capability Notification	{subsNotifUri}	POST	Time Synchronization Capability Notification for a list of UEs.
Time Synchronization Configuration Notification	{configNotifUri}	POST	Current State of Time Synchronization configuration Notification.

5.15.3.2 Time Synchronization Capability Notification

5.15.3.2.1 Description

The Notification is used by the NEF to report the Time Synchronization Capability to the AF.

5.15.3.2.2 Callback URI

The Callback URI "{subsNotifUri}" shall be used with the callback URI variables defined in table 5.15.3.2.2-1.

Table 5.15.3.2.2-1: Callback URI variables

Name	Definition
subsNotifUri	Callback reference provided by the AF during creation of the subscription as defined in Table 5.15.4.3.2-1.

5.15.3.2.3 Operation Definition

5.15.3.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.15.3.2.3.1-1 and the response data structures and response codes specified in table 5.15.3.2.3.1-2 and the Location Headers specified in table 5.15.3.2.3.1-3 and table 5.15.3.2.3.1-4.

Table 5.15.3.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
TimeSyncExposureSubsNotif	M	1	Provides the time synchronization capabilities of a list of UEs by the NEF to the AF.

Table 5.15.3.2.3.1-2: Data structures supported by the POST Response Body on this resource

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

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

Editor's note: Error responses are FFS.

Table 5.15.3.2.3.1-3: Headers supported by the 307 Response Code on this resource

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

Table 5.15.3.2.3.1-4: Headers supported by the 308 Response Code on this resource

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

5.15.3.2.3.2 Notification via Websocket

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

5.15.3.3 Time Synchronization Configuration Notification

5.15.3.3.1 Description

The Notification is used by the NEF to report the state of Time Synchronization service configuration to the AF.

5.15.3.3.2 Callback URI

The Callback URI "{configNotifUri}" shall be used with the callback URI variables defined in table 5.15.3.3.2-1.

Table 5.15.3.3.2-1: Callback URI variables

Name	Definition
configNotifUri	Callback reference provided by the AF during creation of the configuration as defined in Table 5.15.4.3.6-1.

5.15.3.3.3 Operation Definition

5.15.3.3.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.15.3.3.3.1-1 and the response data structures and response codes specified in table 5.15.3.3.3.1-2 and the Location Headers specified in table 5.15.3.3.3.1-3 and table 5.15.3.3.3.1-4.

Table 5.15.3.3.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
TimeSyncExposureConfigNotif	M	1	Provides the current state of time synchronization service configuration by the NEF to the AF.

Table 5.15.3.3.3.1-2: Data structures supported by the POST Response Body on this resource

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

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

Editor's note: Error responses are FFS.

Table 5.15.3.3.3.1-3: Headers supported by the 307 Response Code on this resource

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

Table 5.15.2.2.3.1-4: Headers supported by the 308 Response Code on this resource

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

5.15.3.3.3.2 Notification via Websocket

If supported by both AF and NEF and successfully negotiated, the state of Time Synchroniaition Service Configuration Notification may alternatively be delivered through the Websocket mechanism as defined in subclause 5.2.5.4 of 3GPP TS 29.122 [4].

5.15.4 Data Model

5.15.4.1 General

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

Table 5.15.4.1-1 specifies the data types defined for the TimeSyncExposure API.

Table 5.15.4.1-1: TimeSyncExposure API specific Data Types

Data type	Clause defined	Description	Applicability
AccessTimeDistributionData	5.15.4.3.13	Contains the parameters for the creation of 5G access stratum time distribution configuration.	
ActiveUe	5.15.4.3.16	Contains the UE identifier whose status of the access stratum time distribution is active and the optional requested time synchronization error budget.	
AsTimeResource	5.15.4.4.8	Identifies the supported 5G clock quality.	
ConfigForPort	5.15.4.3.18	Contains configuration information for each port.	
EventFilter	5.15.4.3.10	Contains the filter conditions to match for notifying the event(s) of time synchronization capabilities.	
GmCapable	5.15.4.4.5	Identifies the supported grandmaster.	
InstanceType	5.15.4.4.7	Identifies supported PTP instance type.	
Protocol	5.15.4.4.4	Identifies the supported protocol.	
PtpCapabilitiesPerUe	5.15.4.3.11	Contains the supported PTP capabilities per UE.	
PtpInstance	5.15.4.3.12	Contains PTP instance configuration and activation information requested by the AF.	
StageOfConfiguration	5.15.4.3.17	Contains the state of the time synchronization configuration.	
StatusRequestData	5.15.4.3.14	Contains the parameters for retrieval of the status of the access stratum time distribution for a list of UEs.	
StatusResponseData	5.15.4.3.15	Contains the parameters for the status of the access stratum time distribution for a list of UEs.	
SubscribedEvent	5.15.4.4.6	Identifies the supported event.	
SubsEventNotification	5.15.4.3.8	Represents the notification about a subscribed Individual Event.	
TimeSyncCapability	5.15.4.3.3	Contains the time synchronization capability.	
TimeSyncExposureConfig	5.15.4.3.6	Contains the Time Synchronization Configuration parameters.	
TimeSyncExposureConfigNotif	5.15.4.3.9	Contains the notification of time synchronization service state.	
TimeSyncExposureSubsc	5.15.4.3.2	Contains the requested parameters for the subscription to time synchronization capability notifications.	
TimeSyncExposureSubsNotif	5.15.4.3.7	Contains the notification of time synchronization capability.	

5.15.4.2 Reused data types

The data types reused by the TimeSyncExposure API from other specifications are listed in table 5.15.4.2-1.

Table 5.15.4.2-1: Re-used Data Types

Data type	Reference	Comments
AsTimeDistributionParam	3GPP TS 29.565 [50]	Contains the 5G access stratum time distribution parameters.
Datetime	3GPP TS 29.122 [4]	
Dnn	3GPP TS 29.571 [8]	Identifies a DNN.
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user group.
NotificationMethod	3GPP TS 29.508 [26]	
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
Snssai	3GPP TS 29.571 [8]	Identifies the S-NSSAI.
Supi	3GPP TS 29.571 [8]	Identifies a SUPI.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.15.5-1.
UInteger	3GPP TS 29.571 [8]	Unsigned integer.
Uri	3GPP TS 29.571 [8]	Identifies a referenced resource.

5.15.4.3 Structured data types

5.15.4.3.1 Introduction

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

5.15.4.3.2 Type: TimeSyncExposureSubsc

Table 5.15.4.3.2-1: Definition of type TimeSyncExposureSubsc

Attribute name	Data type	P	Cardinality	Description	Applicability
exterGroupld	ExternalGroupld	C	0..1	Identifies a group of UE(s) for which the time synchronization capabilities is requested. (NOTE 1)	
gpsis	array(Gpsi)	C	1..N	Contains a list of UE for which the time synchronization capabilities is requested. (NOTE 1)	
anyUelnd	boolean	C	0..1	Identifies whether the AF request applies to any UE (i.e. all UEs). This attribute shall set to "true" if applicable for any UE, otherwise, set to "false". (NOTE 1) (NOTE 2)	
notifMethod	NotificationMethod	O	0..1	If "notifMethod" is not supplied, the default value "ON_EVENT_DETECTION" applies.	
dnn	Dnn	C	0..1	Identifies a DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only. (NOTE 2)	
snssai	Snssai	C	0..1	Identifies an S-NSSAI. (NOTE 2)	
afServiceId	string	O	0..1	Identifies a service on behalf of which the AF is issuing the request.	
subscribedEvents	array(SubscribedEvent)	O	1..N	Identifies the requirement to be notified of the event(s).	
eventFilters	array(EventFilter)	O	1..N	Contains the filter conditions to match for notifying the event(s) of time synchronization capabilities for a list of UE(s).	
subsNotifUri	Uri	M	1	Notification URI for time sensitive capability reporting.	
subsNotifId	string	M	1	Notification Correlation ID assigned by the NF service consumer.	
maxReportNbr	UInteger	O	0..1	If omitted, there is no limit.	
expiry	DateTime	C	0..1	This attribute indicates the expiry time of the subscription, after which the NEF shall not send any event notifications and the subscription becomes invalid. It may be included in an event subscription request and may be included in an event subscription response based on operator policies. If an expiry time was included in the request, then the expiry time returned in the response should be less than or equal to that value. If the expiry time is not included in the response, the NF service consumer shall not associate an expiry time for the subscription.	
repPeriod	DurationSec	C	0..1	Is supplied for notification Method "periodic".	
requestTestNotification	boolean	O	0..1	Set to true by the AF to request the NEF to send a test notification as defined in subclause 5.2.5.3 of 3GPP TS 29.122 [4]. Set to false or omitted otherwise.	Notification_test_event

websockNotifConfig	WebsockNotifConfig	O	0..1	Configuration parameters to set up notification delivery over WebSocket protocol.	Notification_websocket
suppFeat	SupportedFeatures	C	0..1	Represents the features supported by the NF service consumer. This parameter shall be supplied by the NF service consumer in the POST request and the response that requested the creation of an Individual Time Synchronization Subscription resource.	
NOTE 1: Only one of the properties "gpsis", "anyUeInd" or "externalGroupId" shall be included.					
NOTE 2: The properties of "anyUeInd" may be included only when the properties of "dnn" and "snssai" are included.					

5.15.4.3.3 Type: TimeSyncCapability

Table 5.15.4.3.3-1: Definition of type TimeSyncCapability

Attribute name	Data type	P	Cardinality	Description	Applicability
upNodeId	Uint64	M	1	Identifies the applicable NW-TT. Contains a TSC user plane node Id. If integrated with TSN, the user plane node Id is a bridge Id defined in IEEE 802.1Q [51] clause 14.2.5.	
gmCapables	array(GmCapable)	C	1..N	Indicates whether user plane node supports acting as a gPTP and/or PTP grandmaster. (NOTE)	
asTimeRes	AsTimeResource	C	0..1	Indicates the supported 5G clock quality (i.e. the source of time used by the 5GS). (NOTE)	
ptpCapForUes	map(PtpCapabilitiesPerUe)	C	1..N	Contains the PTP capabilities supported by the list of UE(s). The key of the map is the gpsi. Shall be present if the "gmCapables" attribute is included.	
NOTE: At least one of the "gmCapables" attribute and "asTimeRes" attribute shall be included.					

5.15.4.3.4 Void

5.15.4.3.5 Void

5.15.4.3.6 Type: TimeSyncExposureConfig

Table 5.15.4.3.6-1: Definition of type TimeSyncExposureConfig

Attribute name	Data type	P	Cardinality	Description	Applicability
upNodeId	Uint64	M	1	Identifies the applicable NW-TT. Contains a TSC user plane node Id. If integrated with TSN, the user plane node Id is a bridge Id defined in IEEE 802.1Q [41] clause 14.2.5.	
reqPtpls	PtpInstance	M	1	Identifies the PtP instance configuration and activation requested by the AF.	
gmEnable	boolean	C	0..1	Indicates that the AF requests 5GS to act as a grandmaster for PTP or gPTP if it is included and set to true. The default value "false" shall apply, if the attribute is not present.	
gmPrio	UInteger	C	0..1	Indicates a priority used as defaultDS.priority1 when generating Announce message when 5GS acts as (g)PTP GM. It may be present if the "gmEnable" is set to true.	
timeDom	UInteger	M	1	Indicate the (g)PTP domain that the (TSN)AF is located in.	
uuErrorBudget	UInteger	O	0..1	Indicates the time synchronization budget for the time synchronization service in units of nanoseconds. Minimum = 1.	
tempValidity	TemporalValidity	O	0..1	Indicates the time period when the time synchronization service for a PTP instance is active.	
configNotifUri	Uri	M	1	Notification URI for configuration state reporting.	
configNotifId	string	M	1	Notification Correlation ID assigned by the NF service consumer.	

5.15.4.3.7 Type: TimeSyncExposureSubsNotif

Table 5.15.4.3.7-1: Definition of type TimeSyncExposureSubsNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
subsNotifId	string	M	1	Notification Correlation ID assigned by the NF service consumer.	
eventNotifs	array(SubsEventNotification)	M	1..N	Notifications about subscribed Individual Events	

5.15.4.3.8 Type SubsEventNotification

Table 5.15.4.3.8-1: Definition of type SubsEventNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
event	SubscribedEvent	M	1	Subscribed events.	
timeSyncCapas	array(TimeSyncCapability)	O	1..N	Contains a list of time synchronization capabilities for the UE(s).	

5.15.4.3.9 Type: TimeSyncExposureConfigNotif

Table 5.15.4.3.9-1: Definition of type TimeSyncExposureConfigNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
configNotifId	string	M	1	Notification Correlation ID assigned by the NF service consumer.	
stateOfConfig	StateOfConfiguration	M	1	Indicates the current state of time synchronization service configuration	

5.15.4.3.10 Type: EventFilter

Table 5.15.4.3.10-1: Definition of type EventFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
instTypes	array(InstanceType)	O	1..N	Indicates the PTP instance type(s).	
transProtocols	array(Protocol)	O	1..N	Indicates the transport protocol type(s).	
ptpProfiles	array(string)	O	1..N	Identifies the supported PTP profiles.	

5.15.4.3.11 Type: PtpCapabilitiesPerUe

Table 5.15.4.3.11-1: Definition of type PtpCapabilitiesPerUe

Attribute name	Data type	P	Cardinality	Description	Applicability
gpsi	Gpsi	M	1	Identifies the UE to which the reported PTP instance below apply.	
ptpCaps	array(EventFilter)	M	1..N	Contains the reported PTP capabilities for the UE.	

5.15.4.3.12 Type: PtpInstance

Table 5.15.4.3.12-1: Definition of type PtpInstance

Attribute name	Data type	P	Cardinality	Description	Applicability
instanceType	InstanceType	M	1	Indicates the PTP instance type.	
protocol	Protocol	M	1	Indicates the protocol type.	
ptpProfile	string	M	1	Identifies the PTP profile.	
portConfigs	array(ConfigForPort)	O	1..N	Contains the configurations for the PTP port(s) in the PTP instance.	

5.15.4.3.13 Type: AccessTimeDistributionData

Table 5.15.4.3.13-1: Definition of type AccessTimeDistributionData

Attribute name	Data type	P	Cardinality	Description	Applicability
gpsis	array(Gpsi)	C	1..N	Identifies a list of UE(s). (NOTE 1)	
exterGroupIid	ExternalGroupIid	C	0..1	Represents a group of users. (NOTE 1)	
anyUeIid	boolean	C	0..1	Identifies whether the AF request applies to any UE (i.e. all UEs). This attribute shall set to "true" if applicable for any UE, otherwise, set to "false". (NOTE 1)	
dnn	Dnn	C	0..1	Identifies a DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only. (NOTE 2)	
snssai	Snssai	C	0..1	Identifies an S-NSSAI. (NOTE 2)	
asTimeDisParam	AsTimeDistributionParam	M	1	5G access stratum time distribution parameters	
suppFeat	SupportedFeatures	C	0..1	Represents the features supported by the NF service consumer. This parameter shall be supplied by the NF service consumer in the POST request and the response that requested the creation of an Individual ASTI Configuration resource.	
NOTE 1: One of "gpsis", "externalGroupIid" or "anyUeIid" attribute shall be provided.					
NOTE 2: Any of it shall be presented if "anyUeIid" attribute is presented.					

5.15.4.3.14 Type: StatusRequestData

Table 5.15.4.3.14-1: Definition of type StatusRequestData

Attribute name	Data type	P	Cardinality	Description	Applicability
gpsis	array(Gpsi)	M	1..N	Identifies a list of UE(s).	
dnn	Dnn	O	0..1	Identifies a DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only.	
snssai	Snssai	O	0..1	Identifies an S-NSSAI.	

5.15.4.3.15 Type: StatusResponseData

Table 5.15.4.3.15-1: Definition of type StatusResponseData

Attribute name	Data type	P	Cardinality	Description	Applicability
inactiveUes	array(Gpsi)	O	1..N	Indicate the UE(s) whose status of the access stratum time distribution is inactive.	
activeUes	array(ActiveUe)	O	1..N	Contains the UE identifier(s) whose status of the access stratum time distribution is active and the optional requested time synchronization error budget.	

5.15.4.3.16 Type: ActiveUe

Table 5.15.4.3.16-1: Definition of type ActiveUe

Attribute name	Data type	P	Cardinality	Description	Applicability
gpsi	Gpsi	M	1	Indicate the UE whose status of the access stratum time distribution is active.	
timeSyncErrBdgt	UInteger	O	0..1	Indicates the time synchronization error budget in terms of time units of nanoseconds.	

5.15.4.3.17 Type: StateOfConfiguration

Table 5.15.4.3.17-1: Definition of type StateOfConfiguration

Attribute name	Data type	P	Cardinality	Description	Applicability
state	boolean	M	1	When it is set to true, it indicates the states of configurations for NW-TT port and all DS-TT port are active. When it is set to false, it indicates the state of configurations for NW-TT port or at least one of the DS-TT port are inactive.	
inactiveNwtt	boolean	C	0..1	When it is included and set to true, it indicates the state of configuration for NW-TT port is inactive. It may be included when the "state" attribute is set to false. Default value is false.	
inactiveDstts	array(Gpsi)	C	1..N	Contains the UE identities. The states of configurations for DS-TT ports corresponding to these UEs are inactive. It may be included when the "state" attribute is set to false.	

5.15.4.3.18 Type: ConfigForPort

Table 5.15.4.3.18-1: Definition of type ConfigForPort

Attribute name	Data type	P	Cardinality	Description	Applicability
gpsi	Gpsi	C	0..1	Identifies the UE/DS-TT which the parameters below apply.	
n6Ind	boolean	C	0..1	Indicates the N6 termination which the parameters below apply.	
ptpEnable	boolean	O	0..1	This is used to set the portDS.portEnable. If omitted, the default value as described in the PTP Profile is used	
logSyncInter	integer	O	0..1	Specifies the mean time interval between successive Sync messages. This is applicable for IEEE Std 1588 [45] Boundary Clock or IEEE Std 802.1AS [46] operation. If omitted, the default value as described in the PTP Profile is used.	
logSyncInterInd	boolean	O	0..1	When set to FALSE, the value of "logSyncInter" attribute is used to set the initialLogSyncInterval as described in IEEE Std 802.1AS [46]. When set to TRUE, the value of "logSyncInter" attribute is used to set the mgtSettableLogSyncInterval as described in IEEE Std 802.1AS [46]. If omitted, the default value as described in the IEEE Std 802.1AS [46] is used.	
logAnnouInter	integer	O	0..1	Specifies the mean time interval between successive Announce messages. This is applicable for IEEE Std 1588 [45] Boundary Clock or IEEE Std 802.1AS [46] operation. If omitted, the default value as described in the PTP Profile is used.	
logAnnouInterInd	boolean	O	0..1	When set to FALSE, the value of "logAnnouInter" attribute is used to set the initialLogAnnounceInterval as described in IEEE 802.1AS [46]. When set to TRUE, the value of "logAnnouInter" attribute is used to set the mgtSettableLogAnnounceInterval as described in IEEE Std 802.1AS [46]. If omitted, the default value as described in the IEEE Std 802.1AS [46] is used.	

NOTE: Either "gpsi" or "n6Ind" attribute shall be included.

5.15.4.4 Simple data types and enumerations

5.15.4.4.1 Introduction

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

5.15.4.4.2 Simple data types

The simple data types defined in table 5.15.4.4.2-1 shall be supported.

Table 5.15.4.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.15.4.4.3 Void

5.15.4.4.4 Enumeration: Protocol

Table 5.15.4.4.4-1: Enumeration Protocol

Enumeration value	Description	Applicability
ETH	Indicates Ethernet as defined in IEEE Std 1588 [45] Annex E is supported.	
IPV4	Indicates IPv4 as defined in IEEE Std 1588 [45] Annex C is supported.	
IPV6	Indicates IPv6 as defined in IEEE Std 1588 [45] Annex D is supported	

5.15.4.4.5 Enumeration: GmCapable

Table 5.15.4.4.5-1: Enumeration GmCapable

Enumeration value	Description	Applicability
GPTP	gPTP grandmaster is supported.	
PTP	PTP grandmaste is supported.	

5.15.4.4.6 Enumeration: SubscribedEvent

Table 5.15.4.4.6-1: Enumeration SubscribedEvent

Enumeration value	Description
AVAILABILITY_FOR_TIME_SYNC_SERVICE	The AF requests to be notified when the UE is availability for time synchronization service.

5.15.4.4.x1 Enumeration: InstanceType

Table 5.15.4.4.x1-1: Enumeration InstanceType

Enumeration value	Description	Applicability
BOUNDARY_CLOCK	Indicates Boundary Clock as defined in IEEE Std 1588 [45].	
E2E_TRANS_CLOCK	Indicates End-to-End Transparent Clock as defined in IEEE Std 1588 [45].	
P2P_TRANS_CLOCK	Indicates Peer-to-Peer Transparent Clock as defined in IEEE Std 1588 [45].	
PTP_RELAY_INSTANCE	Indicates PTP Relay instance as defined in IEEE Std 802.1AS [46]	

5.15.4.4.8 Enumeration: AsTimeResource

The enumeration AsTimeResource represents the supported 5G clock quality (i.e. the source of time used by the 5GS). It shall comply with the provisions defined in table 5.15.4.4.8-1.

Table 5.15.4.4.8-1: Enumeration AsTimeResource

Enumeration value	Description	Applicability
ATOMIC_CLOCK	Indicates atomic clock is supported.	
GNSS	Indicates Global Navigation Satellite System is supported.	
TERRESTRIAL_RADIO	Indicates terrestrial radio is supported.	
SERIAL_TIME_CODE	Indicates serial time code is supported.	
PTP	Indicates PTP is supported.	
NTP	Indicates NTP is supported.	
HAND_SET	Indicates hand set is supported.	
INTERNAL_OSCILLATOR	Indicates internal oscillator is supported.	
OTHER	Indicates other source of time is supported.	

5.15.5 Used Features

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

Table 5.15.5-1: Features used by TimeSyncExposure API

Feature number	Feature Name	Description
1	Notification_websocket	The delivery of notifications over Websocket is supported as defined 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 defined in 3GPP TS 29.122 [4].

5.15.6 Error handling

5.15.6.1 General

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

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

5.15.6.2 Protocol Errors

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

5.15.6.3 Application Errors

The application errors defined for the TimeSyncExposure API are listed in table 5.15.6.3-1. The NEF shall include in the HTTP status code a "ProblemDetails" data structure with the "cause" attribute indicating the application error as listed in table 5.15.6.3-1.

Table 5.15.6.3-1: Application errors

Application Error	HTTP status code	Description

5.16 EcsAddressProvision API

5.16.1 Resources

5.16.1.1 Overview

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

{apiRoot}/3gpp-ecs-address-provision/v1

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-ecs-address-provision" 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 5.16.1.1-1 and the resources and HTTP methods used for the EcsAddressProvision API.

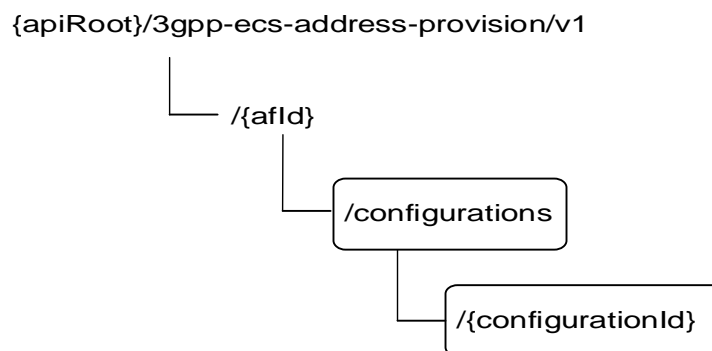


Figure 5.16.1.1-1: Resource URI structure of the EcsAddressProvision API

Table 5.16.1.1-1 provides an overview of the resources and HTTP methods applicable for the EcsAddressProvision API.

Table 5.16.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
ECS Address Provision Configurations	/{afld}/configurations	GET	Read all configurations for a given AF identified by {afld}
		POST	Create a new configuration to provision ECS address(es)
Individual ECS Address Provision Configuration	/{afld}/configurations/{configurationId}	GET	Read an existing configuration identified by {configurationId}
		PUT	Modify all of the properties of an existing configuration identified by {configurationId}
		DELETE	Delete a configuration identified by {configurationId}

5.16.1.2 Resource: ECS Address Provision Configurations

5.16.1.2.1 Introduction

This resource allows a AF to read all active ECS Address Provision Configurations for a given AF, or create a new Individual ECS Address Provision Configuration to the NEF.

5.16.1.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-ecs-address-provision/v1/{afId}/configurations

This resource shall support the resource URI variables defined in table 5.16.1.2.2-1.

Table 5.16.1.2.2-1: 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.

5.16.1.2.3 Resource Methods

5.16.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.16.1.2.2.

5.16.1.2.3.2 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 5.16.1.2.3.2-1.

Table 5.16.1.2.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.16.1.2.3.2-2 and the response data structures and response codes specified in table 5.16.1.2.3.2-3.

Table 5.16.1.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.16.1.2.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.16.1.2.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.16.1.2.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.16.1.2.3.3 POST

The POST method creates a new resource to Individual ECS Address Provision 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 5.16.1.2.3.3-1 and the response data structures and response codes specified in table 5.16.1.2.3.3-2.

Table 5.16.1.2.3.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
EcsAddressProvision	M	1	Parameters to create a configuration to provision ECS address.

Table 5.16.1.2.3.3-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
EcsAddressProvision	M	1	201 Created	The configuration 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 5.16.1.2.3.3-3: Headers supported by the 201 Response Code on this resource

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

5.16.1.3 Resource: Individual ECS Address Provision Configuration

5.16.1.3.1 Introduction

This resource allows a AF to read, update or delete an existing Individual ECS Address Provision Configuration.

5.16.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-ecs-address-provision/v1/{afId}/configurations/{configurationId}

This resource shall support the resource URI variables defined in table 5.16.1.3.2-1.

Table 5.16.1.3.2-1: Resource URI variables for this resource

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

5.16.1.3.3 Resource Methods

5.16.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.16.1.3.2.

5.16.1.3.3.2 GET

The GET method allows to read the active configuration for a given AF and a given configuration 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 5.16.1.3.3.2-1.

Table 5.16.1.3.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.16.1.3.3.2-2 and the response data structures and response codes specified in table 5.16.1.3.3.2-3.

Table 5.16.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.16.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

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

Table 5.16.1.3.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.16.1.3.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.16.1.3.3.3 PUT

The PUT method is used to replace an existing Individual ECS Address Provision 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 5.16.1.3.3.3-1 and the response data structures and response codes specified in table 5.16.1.3.3.3-2.

Table 5.16.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
EcsAddressProvision	M	1	Replace an existing Individual ECS Address Provision Configuration.

Table 5.16.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource

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

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

Table 5.16.1.3.3.3-3: Headers supported by the 307 Response Code on this resource

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

Table 5.16.1.3.3.3-4: Headers supported by the 308 Response Code on this resource

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

5.16.1.3.3.4 DELETE

The DELETE method deletes an existing Individual ECS Address Provision Configuration. The AF shall initiate the HTTP DELETE request message and the NEF shall respond to the message.

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

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

Name	Data type	P	Cardinality	Description
N/A				

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

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

Data type	P	Cardinality	Description
N/A			

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

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

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

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

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

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

5.16.1a Notifications

Notifications are not applicable to this API.

5.16.2 Data Model

5.16.2.1 General

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

Table 5.16.2.1-1 specifies the data types defined for the EcsAddressProvision API.

Table 5.16.2.1-1: EcsAddressProvision API specific Data Types

Data type	Clause defined	Description	Applicability
EcsAddressProvision	5.16.2.3.2	Represents ECS address provision configuration information.	

5.16.2.2 Reused data types

The data types reused by the EcsAddressProvision API from other specifications are listed in table 5.16.2.2-1.

Table 5.16.2.2-1: Re-used Data Types

Data type	Reference	Comments
EcsServerAddr	3GPP TS 29.571 [8]	
Link	3GPP TS 29.122 [4]	Identifies a referenced resource.
SpatialValidityCond	3GPP TS 29.571 [8]	
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.16.3-1.

5.16.2.3 Structured data types

5.16.2.3.1 Introduction

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

5.16.2.3.2 Type: EcsAddressProvision

Table 5.16.2.3.2-1: Definition of type EcsAddressProvision

Attribute name	Data type	P	Cardinality	Description	Applicability
self	Link	C	0..1	Identifies the individual configuration resource. Shall be present in the HTTP GET response when reading all the configurations for an AF.	
ecsServerAddr	EcsServerAddr	M	1	Represents the ECS address(es).	
spatialValidityCond	SpatialValidityCond	O	0..1	Spatial validity condition.	
tgtUe	TargetUeId	O	0..1	Target UE information.	
suppFeat	SupportedFeatures	M	1	Indicates the negotiated supported features.	

5.16.2.4 Simple data types and enumerations

5.16.2.4.1 Introduction

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

5.16.2.4.2 Simple data types

The simple data types defined in table 5.16.2.4.2-1 shall be supported.

Table 5.16.2.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.16.3 Used Features

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

Table 5.16.3-1: Features used by EcsAddressProvision API

Feature number	Feature Name	Description

5.17 AMPolicyAuthorization API

5.17.1 Resources

5.17.1.1 Overview

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

{apiRoot}/3gpp-am-policyauthorization/v1

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-am-policyauthorization" 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 5.17.1.1-1 and the resources and HTTP methods used for the AMPolicyAuthorization API.

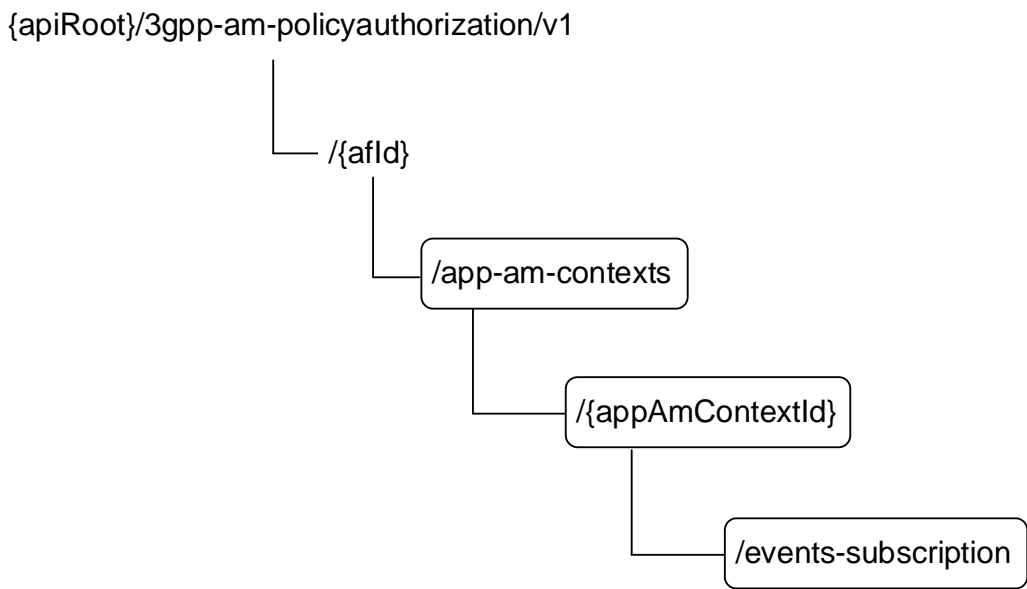


Figure 5.17.1.1-1: Resource URI structure of the AMPolicyAuthorization API

Table 5.17.1.1-1 provides an overview of the resources and HTTP methods applicable for the AMPolicyAuthorization API.

Table 5.17.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
Application AM Contexts	/{afld}/app-am-contexts	POST	Create a new Individual application AM context resource and may create the child AM Policy Events Subscription sub-resource.
Individual application AM Context	/{afld}/app-am-contexts/{appAmContextId}	GET	Reads an existing Individual application AM context resource.
		PATCH	Updates an existing Individual application AM context resource. It can also create or update an AM Policy Events Subscription sub-resource.
		DELETE	Deletes an existing Individual application AM context resource and the child AM Policy Events Subscription sub-resource.
AM Policy Events Subscription	/{afld}/app-am-contexts/{appAmContextId}/events-subscription	PUT	Creates a new AM Policy Events Subscription sub-resource or modifies an existing AM Policy Events Subscription sub-resource.
		DELETE	Deletes an AM Policy Events Subscription sub-resource.

5.17.1.2 Resource: Application AM Contexts

5.17.1.2.1 Introduction

This resource allows an AF to request the creation of a new Individual application AM context resource.

5.17.1.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-am-policyauthorization/v1/{afld}/app-am-contexts

This resource shall support the resource URI variables defined in table 5.17.1.2.2-1.

Table 5.17.1.2.2-1: 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.

5.17.1.2.3 Resource Methods

5.17.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.17.1.2.2.

5.17.1.2.3.2 POST

The POST method creates a new resource to Individual application AM context 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 5.17.1.2.3.2-1 and shall support the response data structures and response codes specified in table 5.17.1.2.3.2-2.

Table 5.17.1.2.3.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AppAmContextExpData	M	1	Contains the exposure information for the creation of a new Individual application AM context resource.

Table 5.17.1.2.3.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AppAmContextExpRespData	M	1	201 Created	Successful case. The Individual application AM context resource was created successfully. The URI of the created resource shall be returned in the "Location" HTTP header.
ProblemDetails	O	0..1	500 Internal Server Error	(NOTE 2)

NOTE 1: 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.

NOTE 2: Failure causes are described in subclause 5.17.5.

Table 5.17.1.2.3.2-3: Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-am-policyauthorization/v1/{afId}/app-am-contexts/{appAmContextId}

5.17.1.3 Resource: Individual Application AM Context

5.17.1.3.1 Introduction

This resource allows an AF to read, update or delete an existing Individual application AM context.

5.17.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-am-policyauthorization/v1/{afId}/app-am-contexts/{appAmContextId}

This resource shall support the resource URI variables defined in table 5.17.1.3.2-1.

Table 5.17.1.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	Subclause 5.2.4 of 3GPP TS 29.122 [4].
afId	string	Identifier of the AF.
appAmContextId	string	Identifier of the application AM context formatted according to IETF RFC 3986 [44].

5.17.1.3.3 Resource Methods

5.17.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.17.1.3.2.

5.17.1.3.3.2 GET

The GET method allows to read the existing application AM context for a given AF and a given application AM context 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 5.17.1.3.3.2-1.

Table 5.17.1.3.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.17.1.3.3.2-2, the response data structures and response codes specified in table 5.17.1.3.3.2-3 and the Location Headers specified in table 5.17.1.3.3.2-4 and table 5.17.1.3.3.2-5.

Table 5.17.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.17.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AppAmContextExpData	M	1	200 OK	Successful case. The exposure information of an existing Individual application AM context in the request URI is returned.
N/A			307 Temporary Redirect	Temporary redirection, during the AM context retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during the AM context retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
NOTE 1: 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.				
NOTE 2: Failure causes are described in subclause 5.17.5.				

Table 5.17.1.3.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.17.1.3.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.17.1.3.3.3 PATCH

The PATCH method is used to modify an existing Individual application AM context. The AF shall initiate the HTTP PATCH request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.17.1.3.3.3-1.

Table 5.17.1.3.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.17.1.3.3.3-2, the response data structures and response codes specified in table 5.17.1.3.3.3-3 and the Location Headers specified in table 5.17.1.3.3.3-4 and table 5.17.1.3.3.3-5.

Table 5.17.1.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
AppAmContextExpUpdateData	M	1	Contains the modification(s) to be applied to the Individual application AM context resource.

Table 5.17.1.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AppAmContextExpRespData	M	1	200 OK	Successful case. The exposure information of the updated application AM context.
N/A			204 No Content	The application AM context was updated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during the AM context modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during the AM context modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
ProblemDetails	O	0..1	400 Bad Request	(NOTE 2)
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
NOTE 1: 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.				
NOTE 2: Failure causes are described in subclause 5.17.5.				

Table 5.17.1.3.3.3-4: Headers supported by the 307 Response Code on this resource

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

Table 5.17.1.3.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative NEF.

5.17.1.3.3.4 DELETE

The DELETE method deletes an existing Individual application AM context. 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 5.17.1.3.3.4-1.

Table 5.17.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.17.1.3.3.4-2 and the response data structures and response codes specified in table 5.17.1.3.3.4-3, and the Location Headers specified in table 5.17.1.3.3.4-4 and table 5.17.1.3.3.4-5.

Table 5.17.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.17.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	Successful case. The application AM context was terminated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during the AM context termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during the AM context termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
NOTE 1: 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.				
NOTE 2: Failure causes are described in subclause 5.17.5.				

Table 5.17.1.3.3.4-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.17.1.3.3.4-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

5.17.1.4 Resource: AM Policy Events Subscription

5.17.1.4.1 Introduction

This resource allows an AF to create a new AM policy events subscription sub-resource or modifies an existing AM policy events subscription sub-resource.

5.17.1.4.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-am-policyauthorization/v1/{afId}/app-am-contexts/{appAmContextId}/events-subscription**

This sub-resource shall support the resource URI variables defined in table 5.17.1.4.2-1.

Table 5.17.1.4.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	Subclause 5.2.4 of 3GPP TS 29.122 [4].
afId	string	Identifier of the AF.
appAmContextId	string	Identifier of the application AM context formatted according to IETF RFC 3986 [44].

5.17.1.4.3 Resource Methods

5.17.1.4.3.1 General

The following subclauses specify the resource methods supported by the sub-resource as described in subclause 5.17.1.4.2.

5.17.1.4.3.2 PUT

The PUT method allows to create a new AM policy events subscription sub-resource in an existing application AM context or modifies an existing AM policy events subscription sub-resource. The AF shall initiate the HTTP PUT request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.17.1.4.3.2-1.

Table 5.17.1.4.3.2-1: URI query parameters supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.17.1.4.3.2-2, the response data structures and response codes specified in table 5.17.1.4.3.2-3 and the Location Headers specified in table 5.17.1.4.3.2-4, table 5.17.1.4.3.2-5 and table 5.17.1.4.3.2-6.

Table 5.17.1.4.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
AmEventsSubscData	M	1	Contains the information for the creation and/or modification of the AM Policy Events Subscription.

Table 5.17.1.4.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AmEventsSubscRespData	M	1	201 Created	Successful case. The AM policy events subscription sub-resource was created. The representation of the AM Policy Events Subscription sub-resource is included within the properties of the AmEventsSubscData data type. The one or more matched events, if available, are included within the properties of the AmEventsNotification data type.
AmEventsSubscRespData	M	1	200 OK	Successful case. The AM policy events subscription sub-resource was modified and a representation of the sub-resource is returned. The representation of the AM Policy Events Subscription sub-resource is included within the properties of the AmEventsSubscData data type. The one or more matched events, if available, are included within the properties of the AmEventsNotification data type.
N/A			204 No Content	Successful case. The AM policy events subscription sub-resource was modified successfully, with no content to be sent in the response message body.
N/A			307 Temporary Redirect	Temporary redirection, during the AM policy events subscription or modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during the AM policy events subscription or modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
NOTE 1: 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.				
NOTE 2: Failure causes are described in subclause 5.17.5.				

Table 5.17.1.4.3.2-4: Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	Contains the URI of the resource in which an AM policy events subscription sub-resource has been created, according to the structure: {apiRoot}/3gpp-am-policyauthorization/v1/{afId}/app-am-contexts/{appAmContextId}/events-subscription

Table 5.17.1.4.3.2-5: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.17.1.4.3.2-6: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

5.17.1.4.3.3 DELETE

The DELETE method deletes existing subscribed AM policy event(s) within the existing Individual application AM context. 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 5.17.1.4.3.3-1.

Table 5.17.1.4.3.3-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.17.1.4.3.3-2 and the response data structures and response codes specified in table 5.17.1.4.3.3-3 and the Location Headers specified in table 5.17.1.4.3.3-4 and table 5.17.1.4.3.3-5.

Table 5.17.1.4.3.3-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.17.1.4.3.3-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	Successful case. The AM policy event(s) subscription resource is deleted.
N/A			307 Temporary Redirect	Temporary redirection, during the AM policy events deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during the AM policy events deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
NOTE 1: 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.				
NOTE 2: Failure causes are described in subclause 5.17.5.				

Table 5.17.1.4.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.17.1.4.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative NEF.

5.17.2 Notifications

5.17.2.1 Introduction

Upon receipt of AM Event Notification from the PCF indicating the subscribed AM policy event is detected, the NEF shall send an HTTP POST message including the notified AM policy 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 5.17.2.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
AM Event Notification	{eventNotifUri}	POST	The AM policy changes event notification is provided by the NEF to the AF.

5.17.2.2 AM Event Notification

5.17.2.2.1 Description

The AM Event Notification is used by the NEF to report one or several observed AM policy change events to AF that has subscribed to such Notifications via the AM policy events subscription sub-resource.

5.17.2.2.2 Callback URI

The Callback URI "{eventNotifUri}" shall be used with the callback URI variables defined in table 5.17.2.2.2-1.

Table 5.17.2.2.2-1: Callback URI variables

Name	Definition
eventNotifUri	Callback reference provided by the AF during creation of the subscription within the AM policy events subscription sub-resource as defined in Table 5.17.3.3.2-1.

5.17.2.2.3 Operation Definition

5.17.2.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.17.2.2.3.1-1 and the response data structures and response codes specified in table 5.17.2.2.3.1-2 and the Location Headers specified in table 5.17.2.2.3.1-3 and table 5.17.2.2.3.1-4.

Table 5.17.2.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AmEventsNotification	M	1	Provides information about the observed access and mobility policy change events by the NEF to the AF.

Table 5.17.2.2.3.1-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	The event notification is received successfully.
N/A			307 Temporary Redirect	Temporary redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.17.2.2.3.1-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI representing the end point of an alternative AF towards which the notification should be redirected.

Table 5.17.2.2.3.1-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI representing the end point of an alternative AF towards which the notification should be redirected.

5.17.2.2.3.2 Notification via Websocket

If supported by both AF and NEF and successfully negotiated, the AM Event Notification may alternatively be delivered through the Websocket mechanism as defined in subclause 5.2.5.4 of 3GPP TS 29.122 [4].

5.17.3 Data Model

5.17.3.1 General

This subclause specifies the application data model supported by the AMPolicyAuthorization API.

Table 5.17.3.1-1 specifies the data types defined for the AMPolicyAuthorization API.

Table 5.17.3.1-1: AMPolicyAuthorization API specific Data Types

Data type	Clause defined	Description	Applicability
AppAmContextExpData	5.17.3.3.2	Represents an Individual application AM context exposure resource.	
AppAmContextExpRespData	5.17.3.5.1	Represents a response to a modification or creation request of an Individual Application AM context resource. It may contain the notification of the already met events.	
AppAmContextExpUpdateData	5.17.3.3.3	Contains the modification(s) to be applied to the Individual application AM context exposure resource.	
GeographicalArea	5.17.3.3.4	Contains geographical area information (e.g. a civic address or shapes).	

5.17.3.2 Reused data types

The data types reused by the AMPolicyAuthorization API from other specifications are listed in table 5.17.3.2-1.

Table 5.17.3.2-1: Re-used Data Types

Data type	Reference	Comments
AmEventsNotification	3GPP TS 29.534 [43]	Describes the notification about the events occurred within an Individual application AM context resource.
AmEventsSubscData	3GPP TS 29.534 [43]	Identifies the AM policy events the application subscribes to.
AmEventsSubscDataRm	3GPP TS 29.534 [43]	This data type is defined in the same way as the "AmEventsSubscData" data type, but with the OpenAPI "nullable: true" property.
AmEventsSubscRespData	3GPP TS 29.534 [43]	It represents a response to an AM policy events subscription request and contains the created/updated AM Policy Events Subscription resource. It may also include the Notification of the events met at the time of subscription.
CivicAddress	3GPP TS 29.572 [34]	Identifies the civic address.
DurationSec	3GPP TS 29.122 [4]	Indicates the time duration.
GeographicArea	3GPP TS 29.572 [34]	Identifies the geographical information with shapes.
Gpsi	3GPP TS 29.571 [8]	Identifies a GPSI.
Link	3GPP TS 29.122 [4]	Identifies a referenced resource.
SupportedFeatures	3GPP TS 29.571 [8]	Used to negotiate the applicability of the optional features defined in table 5.17.4-1.
WebsocketNotifConfig	3GPP TS 29.122 [4]	Contains the configuration parameters to set up notification delivery over Websocket protocol.

5.17.3.3 Structured data types

5.17.3.3.1 Introduction

This clause defines the structured data types to be used in resource representations.

5.17.3.3.2 Type: AppAmContextExpData

Table 5.17.3.3.2-1: Definition of type AppAmContextExpData

Attribute name	Data type	P	Cardinality	Description	Applicability
self	Link	C	0..1	Identifies the individual configuration resource. Shall be present in the HTTP GET response when reading all the configurations for an AF.	
evSubscs	array(AmEventsSubscriptionData)	O	1..N	Represents the subscription to one or more AM policy events.	
gpsi	Gpsi	M	1	Identifies the GPSI.	
highThruInd	boolean	C	0..1	Indicates whether high throughput is desired for the indicated UE traffic. Set to "true" if high throughput is desired; otherwise set to "false". Default value is "false" if omitted. (NOTE)	
covReqs	array(Geographical Area)	C	1..N	Identifies the allowed geographical areas. (NOTE)	
policyDuration	DurationSec	O	0..1	Indicates the time duration that the policy shall last.	
notificationDestination	Uri	C	0..1	Contains the callback URI to receive the notification from the NEF. It shall be present if the "evSubscs" attribute is present.	
suppFeat	SupportedFeatures	C	0..1	Indicates the negotiated supported features.. It shall be supplied by the AF in the POST request that requests a creation of an Individual application AM context resource. It shall be supplied by the NEF in the response to the POST request that requests a creation of an Individual application AM context resource.	
requestTestNotification	boolean	O	0..1	Set to true by the AF to request the NEF to send a test notification as defined in subclause 5.2.5.3 of 3GPP TS 29.122 [4]. Set to false or omitted otherwise.	Notification_test_event
websocketNotifConfig	WebsocketNotifConfig	O	0..1	Configuration parameters to set up notification delivery over WebSocket protocol.	Notification_websocket
NOTE: Either "highThruInd" attribute or "covReqs" attribute or both shall be included.					

5.17.3.3.3 Type: AppAmContextExpUpdateData

Table 5.17.3.3.3-1: Definition of type AppAmContextExpUpdateData

Attribute name	Data type	P	Cardinality	Description	Applicability
evSubscs	array(AmEventsSubscriptionDataRm)	O	1..N	Represents the subscription to one or more AM policy events.	
highThruInd	boolean	O	0..1	Indicates whether high throughput is desired for the indicated UE traffic. Set to "true" if high throughput is desired; otherwise set to "false". Default value is "false" if omitted.	
covReqs	array(GeographicalArea)	O	1..N	Identifies the allowed geographical areas.	
policyDuration	DurationSec	O	0..1	Indicates the time duration that the policy shall last.	
notificationDestination	Uri	C	0..1	Contains the callback URI to receive the notification from the NEF. It shall be present if the "evSubscs" attribute is present.	

5.17.3.3.4 Type: GeographicalArea

Table 5.17.3.3.4-1: Definition of type GeographicalArea

Attribute name	Data type	P	Cardinality	Description	Applicability
civicAddress	CivicAddress	C	0..1	Identifies a civic address.	
shapes	GeographicArea	C	0..1	Identifies a geographic area specified by different shapes.	

NOTE: One of "civicAddress" attribute or "shapes" attribute shall be included.

5.17.3.4 Simple data types and enumerations

5.17.3.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

5.17.3.4.2 Simple data types

The simple data types defined in table 5.17.3.4.2-1 shall be supported.

Table 5.17.3.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.17.3.5 Data types describing alternative data types or combinations of data types

5.17.3.5.1 Type: AppAmContextExpRespData

Table 5.17.3.5.1-1: Definition of type AppAmContextExpRespData as a list of non-exclusive alternatives

Data type	Cardinality	Description	Applicability
AmEventsNotification	0..1	It represents the notification of a match event during the creation or modification of the Individual application AM context data.	
AppAmContextExpData	1	It represents the Individual application AM context resource.	

5.17.4 Used Features

The table below defines the features applicable to the AMPolicyControl API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.17.4-1: Features used by AMPolicyAuthorization 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].

5.17.5 Error handling

5.17.5.1 General

HTTP error handling shall be supported as specified in subclause 5.2.6 of 3GPP TS 29.122 [4].

In addition, the requirements in the following subclauses shall apply.

5.17.5.2 Protocol Errors

In this Release of the specification, there are no additional protocol errors applicable for the AMPolicyAuthorization API.

5.17.5.3 Application Errors

The application errors defined for the AMPolicyAuthorization API are listed in table 5.17.5.3-1. If the NEF receive the HTTP status code a "ProblemDetails" data structure with the "cause" attribute indicating the application error from the PCF, accordingly the NEF shall include in the HTTP status code a "ProblemDetails" data structure with the "cause" attribute indicating the application error as listed in table 5.17.5.3-1.

Table 5.17.5.3-1: Application errors

Application Error	HTTP status code	Description
INVALID_POLICY_REQUEST	400 Bad Request	The HTTP request is rejected because the service information for the AM context is invalid or insufficient for the PCF to perform the requested action. (NOTE 1)
APPLICATION_AM_CONTEXT_NOT_FOUND	404 Not Found	The HTTP request is rejected because the specified Individual Application AM Context does not exist. (NOTE 3)
POLICY_ASSOCIATION_NOT_AVAILABLE	500 Internal Server Error	The PCF failed in executing binding with the UE/AM Policy Context. (NOTE 2)
NOTE 1: This application error is included in the response to the POST request and to the PATCH request. NOTE 2: This application error is included in the response to the POST request. NOTE 3: This application error is included in the responses to the GET, PATCH and DELETE requests to the Individual Application AM Context resource, and to the PUT and DELETE requests to the AM Policy Events Subscription resource.		

5.18 AMInfluence API

5.18.1 Resources

5.18.1.1 Overview

All resource URIs of this API should have the following root:

{apiRoot}/3gpp-am-influence/v1

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-am-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 5.18.1.1-1 and the resources and HTTP methods used for the AMInfluence API.

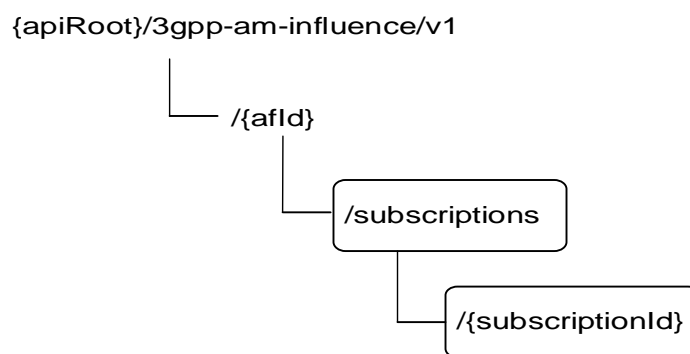


Figure 5.18.1.1-1: Resource URI structure of the AMInfluence API

Table 5.18.1.1-1 provides an overview of the resources and HTTP methods applicable for the AMInfluence API.

Table 5.18.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
AM Influence Subscription	/{afld}/subscriptions	GET	Read all subscriptions for a given AF.
		POST	Create a new subscription to AM influence.
Individual AM Influence Subscription	/{afld}/subscriptions/{subscriptionId}	GET	Read a subscription to AM influence.
		PUT	Modify all of the properties of an existing subscription to AM influence.
		PATCH	Modify part of the properties of an existing subscription to AM influence.
		DELETE	Delete a subscription to AM influence.

5.18.1.2 Resource: AM Influence Subscription

5.18.1.2.1 Introduction

This resource allows an AF to read all active AM influence subscriptions and create a new subscription resource for a given AF.

5.18.1.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-am-influence/v1/{afld}/subscriptions

This resource shall support the resource URI variables defined in table 5.18.1.2.2-1.

Table 5.18.1.2.2-1: 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.

5.18.1.2.3 Resource Methods

5.18.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.18.1.2.2.

5.18.1.2.3.2 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 5.18.1.2.3.2-1.

Table 5.18.1.2.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.18.1.2.3.2-2 and the response data structures and response codes specified in table 5.18.1.2.3.2-3.

Table 5.18.1.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.18.1.2.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(AmInfluSub)	M	0..N	200 OK	The subscription information for the AF in the request URI are returned.
N/A			307 Temporary Redirect	Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.18.1.2.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.18.1.2.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

5.18.1.2.3.3 POST

The POST method creates a new subscription resource to AM 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 5.18.1.2.3.3-1 and the response data structures and response codes specified in table 5.18.1.2.3.3-2.

Table 5.18.1.2.3.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AmInfluSub	M	1	Parameters to create a resource for the AM Influence and/or notification about service area coverage outcome events with the NEF.

Table 5.18.1.2.3.3-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AmInfluSub	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 5.18.1.2.3.3-3: Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-am-Influence/v1/{afId}/subscriptions/{subscriptionId}

5.18.1.3 Resource: Individual AM Influence Subscription

5.18.1.3.1 Introduction

This resource allows an AF to read, update or delete an existing AM Influence subscription.

5.18.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-am-influence/v1/{afId}/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 5.18.1.3.2-1.

Table 5.18.1.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	Subclause 5.2.4 of 3GPP TS 29.122 [4].
afId	string	Identifier of the AF.
subscriptionId	string	Identifier of the subscription.

5.18.1.3.3 Resource Methods

5.18.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.18.1.3.2.

5.18.1.3.3.2 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 5.18.1.3.3.2-1.

Table 5.18.1.3.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.18.1.3.3.2-2 and the response data structures and response codes specified in table 5.18.1.3.3.2-3.

Table 5.18.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.18.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AmInfluSub	M	1	200 OK	The subscription information for the AF in the request URI are returned.
N/A			307 Temporary Redirect	Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.18.1.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.18.1.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

5.18.1.3.3.3 PUT

The PUT method is used to replace 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 5.18.1.3.3.3-1 and the response data structures and response codes specified in table 5.18.1.3.3.3-2.

Table 5.18.1.3.3.3-1: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
AmInfluSub	M	1	Modify an existing AM Influence subscription.

Table 5.18.1.3.3.3-2: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AmInfluSub	M	1	200 OK	The subscription was replaced successfully and a representation is returned.
N/A			204 No Content	The subscription was replaced successfully.

N/A			307 Temporary Redirect	Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.18.1.3.3.3-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.18.1.3.3.3-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

5.18.1.3.3.4 PATCH

The PATCH method allows to change some properties of an existing AM 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 5.18.1.3.3.4-1 and the response data structures and response codes specified in table 5.18.1.3.3.4-2.

Table 5.18.1.3.3.4-1: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
AmInfluSubPatch	M	1	Partial update of a subscription to AM influence and/or notifications about service area coverage outcome events with the NEF.

Table 5.18.1.3.3.4-2: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AmInfluSub	M	1	200 OK	The subscription was partial modified successfully and a representation is returned.
N/A			204 No Content	The subscription was partial modified successfully.
N/A			307 Temporary Redirect	Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].

NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

Table 5.18.1.3.3.4-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.18.1.3.3.4-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

5.18.1.3.3.5 DELETE

The DELETE method deletes an existing individual AM 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 5.18.1.3.3.5-1.

Table 5.18.1.3.3.5-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.18.1.3.3.5-2 and the response data structures and response codes specified in table 5.18.1.3.3.5-3.

Table 5.18.1.3.3.5-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.18.1.3.3.5-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	The subscription was terminated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.18.1.3.3.5-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.18.1.3.3.5-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

5.18.2 Notifications

5.18.2.1 Introduction

Upon receipt of a service area coverage outcome event from the PCF, the NEF shall send an HTTP POST message including the notified 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 5.18.2.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Event Notification	{notificationDestination}	POST	The service area coverage outcome event from the NEF to the AF.

5.18.2.2 Event Notification

5.18.2.2.1 Description

The Event Notification is used by the NEF to report notification of the service area coverage outcome event from the PCF to the AF.

5.18.2.2.2 Target URI

The Callback URI "{notificationDestination}" shall be used with the callback URI variables defined in table 5.18.2.2.2-1.

Table 5.18.2.2.2-1: Callback URI variables

Name	Data type	Definition
notificationDestination	Link	Callback reference provided by the AF during creation/modification of the subscription within the AmInfluSub data type as defined in Table 5.18.3.3.2-1.

5.18.2.2.3 Operation Definition

5.18.2.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.18.2.2.3.1-1 and the response data structures and response codes specified in table 5.18.2.2.3.1-2.

Table 5.18.2.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AmInfluEventNotif	M	1	The service area coverage outcome event notification is provided by the NEF to the AF.

Table 5.18.2.2.3.1-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	The event notification is received successfully.
N/A			307 Temporary Redirect	Temporary redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].

NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

Table 5.18.2.2.3.1-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative AF towards which the notification should be redirected.

Table 5.18.2.2.3.1-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative AF towards which the notification should be redirected.

5.18.2.2.3.2 Notification via Websocket

If supported by both AF and NEF and successfully negotiated, the AmInfluEventNotif may alternatively be delivered through the Websocket mechanism as defined in subclause 5.2.5.4 of 3GPP TS 29.122 [4].

5.18.3 Data Model

5.18.3.1 General

This subclause specifies the application data model supported by the AMInfluence API.

Table 5.18.3.1-1 specifies the data types defined for the AMInfluence API.

Table 5.18.3.1-1: AMInfluence API specific Data Types

Data type	Clause defined	Description	Applicability
AmInfluEvent	5.18.3.4.3	Represents the service area coverage outcome event.	
AmInfluEventNotif	5.18.3.3.4	Represents an AM influence event notification.	
AmInfluSub	5.18.3.3.2	Represents an AM influence subscription.	
AmInfluSubPatch	5.18.3.3.3	Represents parameters to request the modification of an AM influence subscription resource.	
DnnSnssaiInformation	5.18.3.3.5	Represents a (DNN, SNSSAI) combination.	

5.18.3.2 Reused data types

The data types reused by the AMInfluence API from other specifications are listed in table 5.18.3.2-1.

Table 5.18.3.2-1: Re-used Data Types

Data type	Reference	Comments
Dnn	3GPP TS 29.571 [8]	Identifies a DNN.
DurationSec	3GPP TS 29.571 [8]	Indicates the time duration.
EthFlowDescription	3GPP TS 29.514 [7]	Contains the Ethernet data flow information.
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.
GeographicalArea	5.17.3.3.4	Identifies the geographical area information.
Link	3GPP TS 29.122 [4]	Identifies a referenced resource.
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 5.18.4-1.
WebsocketNotifConfig	3GPP TS 29.122 [4]	Contains the configuration parameters to set up notification delivery over Websocket protocol.

5.18.3.3 Structured data types

5.18.3.3.1 Introduction

This subclause defines the structured data types to be used in resource representations.

5.18.3.3.2 Type: AmInfluSub

This type represents an AM influence subscription. The same structure is used in the subscription request and subscription response.

Table 5.18.3.3.2-1: Definition of type AMInfluSub

Attribute name	Data type	P	Cardinality	Description	Applicability (NOTE 1)
afTransId	string	M	1	Identifies an NEF Northbound interface transaction request, generated by the AF.	
supi	Supi	O	0..1	Identifies a user with SUPI. (NOTE 3)	
gpsi	Gpsi	O	0..1	Identifies a user with GPSI. (NOTE 3)	
externalGroupId	ExternalGroupId	O	0..1	Identifies a group of users. (NOTE 3)	
anyUeInd	boolean	O	0..1	Identifies whether the AF request applies to any UE (i.e. all UEs). This attribute shall set to "true" if applicable for any UE, otherwise, set to "false". (NOTE 2) (NOTE 3)	
dnnSnssaiInfos	array(DnnSnssaiInformation)	O	1..N	Each of the element identifies a combination of (DNN, S-NSSAI).	
afAppIds	array(string)	O	1..N	Identifies application(s).	
highThruInd	boolean	C	0..1	Indicates whether high throughput is desired for UE traffic. Set to "true" if high throughput is desired; otherwise set to "false". Default value is "false" if omitted. (NOTE 4)	
geoAreas	array(Geographical Area)	C	1..N	Identifies geographical areas of the user where the request is applicable. (NOTE 4)	
policyDuration	DurationSec	O	0..1	Indicates the time duration that the policy shall last.	
self	Link	C	0..1	Link to the created resource. This parameter shall be supplied by the NEF in HTTP responses that include an object of AmInfluSub type.	
subscribedEvents	array(AmInfluEvent)	O	1..N	Identifies the requirement to be notified of the event(s).	
notificationDestination	Link	C	0..1	Contains the Callback URL to receive the notification from the NEF. It shall be present if the "subscribedEvents" is present.	
requestTestNotification	boolean	O	0..1	Set to true by the AF to request the NEF to send a test notification as defined in subclause 5.2.5.3 of 3GPP TS 29.122 [4]. Set to false or omitted otherwise.	Notification_test_event
websocketNotifConfig	WebsocketNotifConfig	O	0..1	Configuration parameters to set up notification delivery over WebSocket protocol.	Notification_websocket
suppFeat	SupportedFeatures	C	0..1	Indicates the list of Supported features used as described in subclause 5.18.4. 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 5.18.4 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 target to any UE, then "anyUeInd" attribute together with "dnnSnssaiInfos" attribute shall be included.
NOTE 3:	One of individual UE identifier (i.e. "supi" or "gpsi" attribute), External Group Identifier (i.e. "externalGroupId") or any UE indication "anyUeInd" shall be included. "anyUeInd" attribute is applicable only if an Application ID is also provided.
NOTE 4:	Any of the "highThruInd" attribute or "geoAreas" attribute shall be included.

5.18.3.3.3 Type: AmInfluSubPatch

This type represents AM influence subscription parameters provided by the AF to the NEF. The structure is used for HTTP PATCH request.

Table 5.18.3.3.3-1: Definition of type AmInfluSubPatch

Attribute name	Data type	P	Cardinality	Description	Applicability (NOTE 2)
highThruInd	boolean	C	0..1	Indicates whether high throughput is desired for UE traffic. Set to "true" if high throughput is desired; otherwise set to "false". Default value is "false" if omitted. (NOTE 1)	
geoAreas	array(Geographical Area)	C	1..N	Identifies geographical areas of the user where the UE is located. (NOTE 1)	
policyDuration	DurationSecRm	O	0..1	Indicates the time duration that the policy shall last.	
dnnSnssaiInfos	array(DnnSnssaiInformation)	O	1..N	Each of the element identifies a combination of (DNN, S-NSSAI).	
subscribedEvents	array(AmInfluEvent)	O	1..N	Identifies the requirement to be notified of the event(s).	
notificationDestination	Link	C	0..1	Contains the Callback URL to receive the notification from the NEF. It shall be present if the "subscribedEvents" is present.	
afAppIds	array(string)	O	1..N	Identifies application(s).	
afTransId	string	M	1	Identifies the AF transaction request to be updated.	
NOTE 1:	Any of the "highThruInd" attribute or "geoAreas" attribute shall be included.				
NOTE 2:	The value of the property shall be set to NULL for removal.				

5.18.3.3.4 Type: AmInfluEventNotif

Table 5.18.3.3.4-1: Definition of type AmInfluEventNotif

Attribute name	Data type	P	Cardinality	Description	Applicability (NOTE 1)
afTransId	string	M	1	Identifies the AF request for AM policy influence that the event report is related to.	
event	AmInfluEvent	M	1	Notified event.	
geoAreas	array(GeographicalArea)	C	1..N	Identifies geographical areas of the user where the UE is located.	

5.18.3.3.5 Type: DnnSnssaiInformation

Table 5.18.3.3.5-1: Definition of type DnnSnssaiInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
dnn	Dnn	O	0..1	Identifies a DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only.	
snssai	Snssai	O	0..1	Identifies an S-NSSAI.	

5.18.3.4 Simple data types and enumerations

5.18.3.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

5.18.3.4.2 Simple data types

The simple data types defined in table 5.18.3.4.2-1 shall be supported.

Table 5.18.3.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.18.3.4.3 Enumeration: AmInfluEvent

The enumeration AmInfluEvent represents the service area coverage outcome event. It shall comply with the provisions defined in table 5.18.3.4.3-1.

Table 5.18.3.4.3-1: Enumeration AmInfluEvent

Enumeration value	Description
SERVICE_AREA_COVR_G_OUTCOME	Indicates the service area coverage outcome.

5.18.4 Used Features

The table below defines the features applicable to the AMInfluence API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.18.4-1: Features used by AMInfluence 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].
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.		

5.19 MBSTMGI API

5.19.1 Introduction

The Nnef_MBSTMGI service shall use the MBSTMGI API.

The API URI of MBSTMGI API shall be:

{apiRoot}/3gpp-mbs-tmgi/v1

with the following components:

- "apiRoot" is set as defined in subclause 5.2.4 of 3GPP TS 29.122 [4].
- "apiName" shall be set to "3gpp-mbs-tmgi".
- "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.

5.19.2 Resources

There are no resources defined for this API in this release of the specification.

5.19.3 Custom Operations without associated resources

5.19.3.1 Overview

The structure of the custom operation URIs of the MBSTMGI API is shown in Figure 5.19.3.1-1.

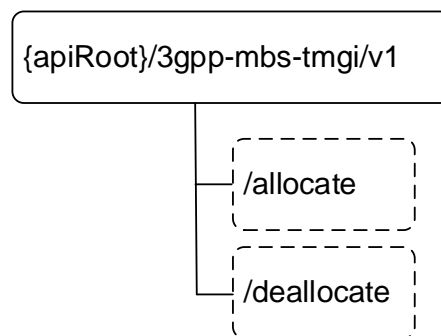


Figure 5.19.3.1-1: Custom operation URI structure of the MBSTMGI API

Table 5.19.3.1-1 provides an overview of the custom operations and applicable HTTP methods.

Table 5.19.3.1-1: Custom operations without associated resources

Operation name	Custom operation URI	Mapped HTTP method	Description
Allocate	/allocate	POST	Request the allocation of TMGI(s) for new MBS session(s) or the refresh of the expiry time of already allocated TMGI(s).
Deallocate	/deallocate	POST	Request the deallocation of TMGI(s).

5.19.3.2 Operation: Allocate

5.19.3.2.1 Description

The custom operation enables an AF to request the allocation of TMGI(s) for new MBS session(s) or the refresh of the expiry time of already allocated TMGI(s).

5.19.3.2.2 Operation Definition

This operation shall support the request and response data structures and response codes specified in table 5.19.3.2.2-1 and table 5.19.3.2.2-2.

Table 5.19.3.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
TmgiAllocRequest	M	1	Represents the parameters to request the allocation of TMGI(s) for new MBS session(s) or the refresh of the expiry time of already allocated TMGI(s).

Table 5.19.3.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
TmgiAllocResponse	M	1	200 OK	Successful case: The TMGI allocation information (e.g. allocated TMGIs, expiry time) or the refreshed expiry time for the concerned already allocated TMGI(s) is/are returned to the requesting AF.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the POST method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.19.3.2.2-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative target URI located in an alternative NEF.

Table 5.19.3.2.2-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative target URI located in an alternative NEF.

Editor's note: Error cases and the related responses are FFS.

5.19.3.3 Operation: Deallocate

5.19.3.3.1 Description

The custom operation enables an AF to request the deallocation of TMGI(s).

5.19.3.3.2 Operation Definition

This operation shall support the request and response data structures and response codes specified in table 5.19.3.3.2-1 and table 5.19.3.3.2-2.

Table 5.19.3.3.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
TmgiDeallocRequest	M	1	Represents the TMGI(s) deallocation request information (e.g. list of TMGI(s) to be deallocated).

Table 5.19.3.3.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case: The TMGI(s) have been deallocated.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the POST method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.19.3.3.2-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative target URI located in an alternative NEF.

Table 5.19.3.3.2-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative target URI located in an alternative NEF.

Editor's note: Error cases and the related responses are FFS.

5.19.4 Notifications

5.19.4.1 Introduction

Upon expiry of TMGI(s), the NEF shall send a notification to the AF including the concerned TMGI(s).

The NEF and the AF shall support the notification mechanism described in subclause 5.2.5 of 3GPP TS 29.122 [4]. Table 5.19.3.1-1 describes the notifications defined for this API.

Table 5.19.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Notification of Allocated TMGI(s) Timer Expiry	{notificationUri}	POST	Enable the NEF to notify an AF of the timer expiry for already allocated TMGI(s).

5.19.4.2 Notification of Allocated TMGI(s) Timer Expiry

5.19.4.2.1 Description

The Notification is used by the NEF to report timer expiry of already allocated TMGI(s) to the AF.

5.19.4.2.2 Callback URI

The Callback URI "{notificationUri}" shall be used with the callback URI variables defined in table 5.19.4.2.2-1.

Table 5.19.4.2.2-1: Callback URI variables

Name	Definition
notificationUri	Callback reference provided by the AF during the TMGI(s) allocation or expiry time refresh request as defined in Table 5.19.5.2.2-1.

5.19.4.2.3 Operation Definition

5.19.4.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.19.4.2.3.1-1 and the response data structures and response codes specified in table 5.19.4.2.3.1-2 and the Location Headers specified in table 5.19.4.2.3.1-3 and table 5.19.4.2.3.1-4.

Table 5.19.4.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ExpiryNotif	M	1	Represents the TMGI(s) timer expiry notification information (e.g. list of TMGI(s) for which the timer has expired).

Table 5.19.4.2.3.1-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The notification is received successfully.
n/a			307 Temporary Redirect	Temporary redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection, during event notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].

NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

Table 5.19.4.2.3.1-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative AF towards which the notification should be redirected.

Table 5.19.4.2.3.1-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative AF towards which the notification should be redirected.

Editor's note: Error cases and the related responses are FFS.

5.19.4.2.3.2 Notification via Websocket

If supported by both AF and NEF and successfully negotiated, the Notification of Allocated TMGI(s) Timer Expiry may alternatively be delivered through the Websocket mechanism as defined in subclause 5.2.5.4 of 3GPP TS 29.122 [4].

Table 5.19.4.2.3.2-1: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative AF towards which the notification should be redirected.

Table 5.19.4.2.3.2-2: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative AF towards which the notification should be redirected.

Editor's note: Error cases and the related responses are FFS.

5.19.5 Data Model

5.19.5.1 General

This subclause specifies the application data model supported by the MBSTMGI API. Table 5.19.5.1-1 specifies the data types defined for the MBSTMGI API.

Table 5.19.5.1-1: MBSTMGI specific Data Types

Data type	Clause defined	Description	Applicability
TmgiAllocRequest	5.19.5.2.2	Represents the full set of parameters to initiate a TMGI(s) allocation request or the refresh of the expiry time of already allocated TMGI(s).	
TmgiAllocResponse	5.19.5.2.3	Represents TMGI(s) allocation information or the refreshed expiry time for already allocated TMGI(s).	
TmgiDeallocRequest	5.19.5.2.4	Represents information to request the deallocation of TMGI(s).	
ExpiryNotif	5.19.5.2.5	Represents TMGI(s) timer expiry notification information.	

Table 5.19.5.1-2 specifies data types re-used by the MBSTMGI API from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the MBSTMGI API.

Table 5.19.5.1-2: MBSTMGI API re-used Data Types

Data type	Reference	Comments	Applicability
Tmgi	3GPP TS 29.571 [8]	Contains a TMGI.	
TmgiAllocate	3GPP TS 29.532 [52]	Contains parameters to initiate a TMGI(s) allocation request or the refresh of the expiry time of already allocated TMGI(s).	
TmgiAllocated	3GPP TS 29.532 [52]	Contains the TMGI(s) allocation information or the refreshed expiry time for already allocated TMGI(s).	
Uri	3GPP TS 29.122 [4]	Contains a TMGI.	
WebsocketNotifConfig	3GPP TS 29.122 [4]	Contains the configuration parameters to set up notification delivery over Websocket protocol.	

5.19.5.2 Structured data types

5.19.5.2.1 Introduction

This subclause defines the structured data types to be used in resource representations.

5.19.5.2.2 Type: TmgiAllocRequest

Table 5.19.5.2.2-1: Definition of type TmgiAllocRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
afId	string	M	1	Contains the identifier of the AF that is sending the request.	
tmgiParams	TmgiAllocate	M	1	Contains the parameters to request the allocation of TMGI(s) for new MBS session(s) or the refresh of the expiry time of already allocated TMGI(s).	
notificationUri	Uri	O	0..1	The notification URI via which the AF desires to receive notifications on timer expiry for TMGI(s).	
requestTestNotification	boolean	O	0..1	Set to "true" by the AF to request the NEF to send a test notification as defined in subclause 5.2.5.3 of 3GPP TS 29.122 [4]. Set to "false" or omitted otherwise.	Notification_test_event
websocketNotifConfig	WebsocketNotifConfig	O	0..1	Configuration parameters to set up notification delivery over Websocket protocol.	Notification_websocket
suppFeat	SupportedFeatures	O	0..1	Indicates the features supported by the AF.	

5.19.5.2.3 Type: TmgiAllocResponse

Table 5.19.5.2.3-1: Definition of type TmgiAllocResponse

Attribute name	Data type	P	Cardinality	Description	Applicability
tmgInfo	TmgiAllocated	M	1	Contains the TMGI(s) allocation information or the refreshed expiry time for already allocated TMGI(s).	
suppFeat	SupportedFeatures	O	0..1	Indicates the features supported by both the AF and the NEF.	

5.19.5.2.4 Type: TmgiDeallocRequest

Table 5.19.5.2.4-1: Definition of type TmgiDeallocRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
afId	string	M	1	Contains the identifier of the AF that is sending the request.	
tmgis	array(Tmgi)	M	1..N	Contains the list of TMGI(s) to be deallocated.	

5.19.5.2.5 Type: ExpiryNotif

Table 5.19.5.2.5-1: Definition of type ExpiryNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
tmgis	array(Tmgi)	M	1..N	Contains the list of previously allocated TMGI(s) with expired timer.	

5.19.5.3 Simple data types and enumerations

5.19.5.3.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

5.19.5.3.2 Simple data types

The simple data types defined in Table 5.19.5.3.2-1 shall be supported.

Table 5.19.5.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.19.6 Used Features

The table below defines the features applicable to the MBSTMGI API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.19.6-1: Features used by MBSTMGI API

Feature number	Feature Name	Description
1	Notification_websoc ket	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_ev ent	The testing of notification connection is supported as described in 3GPP TS 29.122 [4].

5.20 MBSSession API

5.20.1 Introduction

The Nnef_MBSSession service shall use the MBSSession API.

The API URI of MBSSession API shall be:

{apiRoot}/3gpp-mbs-session/v1

with the following components:

- "apiRoot" is set as defined in subclause 5.2.4 of 3GPP TS 29.122 [4].
- "apiName" shall be set to "3gpp-mbs-session".
- "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.

5.20.2 Resources

This subclause describes the structure for the Resource URIs as shown in figure 5.20.2.1-1 and the resources and HTTP methods used for the MBSSession API.

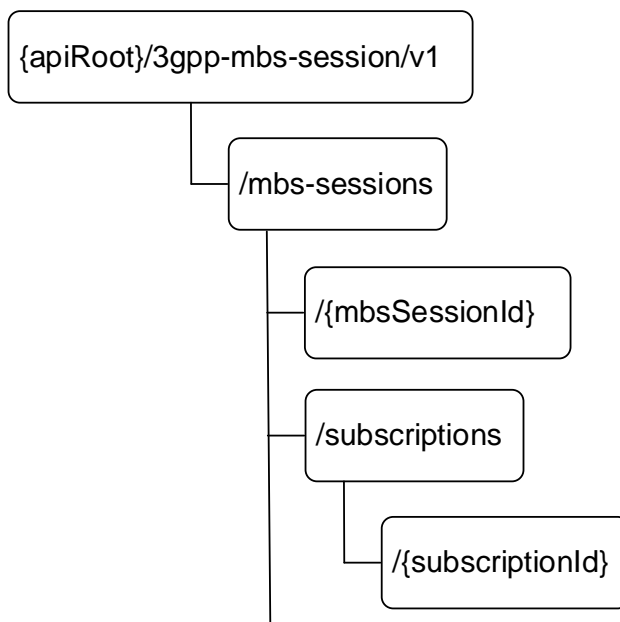


Figure 5.20.2.1-1: Resource URI structure of the MBSSession API

Table 5.20.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.20.2.1-1: Resources and methods overview

Resource name	Resource URI (relative path under API URI)	HTTP method or custom operation	Description (service operation)
MBS Sessions	/mbs-sessions	POST	Create an MBS Session.
Individual MBS Session	/mbs-sessions/{mbsSessionId}	PATCH	Modify an existing Individual MBS Session resource.
		DELETE	Delete an existing Individual MBS Session resource.
MBS Session Subscriptions	/mbs-sessions/subscriptions	GET	Retrieve all the MBS Session Subscriptions
		POST	Create an MBS Session Subscription.
Individual MBS Session Subscription	/mbs-sessions/subscriptions/{subscriptionId}	GET	Retrieve an existing Individual MBS Session Subscription resource.
		DELETE	Delete an existing Individual MBS Session Subscription resource.

5.20.2.2 Resource: MBS sessions

5.20.2.2.1 Introduction

This resource represents the collection of MBS sessions managed by the NEF.

This resource is modelled with the Collection resource archetype (see subclause C.2 of 3GPP TS 29.501 [3]).

5.20.2.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-mbs-session/v1/mbs-sessions

This resource shall support the resource URI variables defined in table 5.20.2.2.2-1.

Table 5.20.2.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See subclause 5.20.1.

5.20.2.2.3 Resource Methods

5.20.2.2.3.1 POST

This method enables an AF to request the creation of an MBS session resource at the NEF.

This method shall support the URI query parameters specified in table 5.20.2.2.3.1-1.

Table 5.20.2.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
N/A					

This method shall support the request data structures specified in table 5.20.2.2.3.1-2 and the response data structures and response codes specified in table 5.20.2.2.3.1-3.

Table 5.20.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MbsSessionCreateReq	M	1	Representation of the MBS session to be created in the NEF.

Table 5.20.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MbsSessionCreateRsp	M	1	201 Created	Successful case. A representation of the created Individual MBS Session resource is returned. The URI of the created resource shall be returned in an HTTP "Location" header.
N/A			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status code for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.20.2.2.3.1-4: Headers supported by the 201 response code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-mbs-session/v1/mbs-sessions/{mbsSessionId}

Table 5.20.2.2.3.1-5: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative target URI located in an alternative NEF.

Table 5.20.2.2.3.1-6: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative target URI of the resource located in an alternative NEF.

5.20.2.3 Resource: Individual MBS Session

5.20.2.3.1 Introduction

This resource represents an Individual MBS Session managed by the NEF.

This resource is modelled with the Document resource archetype (see subclause C.1 of 3GPP TS 29.501 [3]).

5.20.2.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-mbs-session/v1/mbs-sessions/{mbsSessionId}

This resource shall support the resource URI variables defined in table 5.20.2.3.2-1.

Table 5.20.2.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See subclause 5.20.1.
mbsSessionId	MbsSessionId	Contains the MBS session identifier.

5.20.2.3.3 Resource Standard Methods

5.20.2.3.3.1 PATCH

The HTTP PATCH method is used to partially modify an existing Individual MBS Session resource in the NEF. The AF shall initiate the HTTP PATCH request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.20.2.3.3.1-1.

Table 5.20.2.3.3.1-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.20.2.3.3.1-2 and the response data structures and response codes specified in table 5.20.2.3.3.1-3.

Table 5.20.2.3.3.1-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
array(PatchItem)	M	1	Represents the list of modifications to be applied to the concerned existing Individual MBS Session resource , as specified in subclause 4.6.1.1.3 of 3GPP TS 29.501 [32].

Table 5.20.2.3.3.1-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful response. The Individual MBS Session resource was successfully modified.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].

NOTE 1: The mandatory HTTP error status code for the PATCH method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

Editor's Note: Errors are FFS.

Table 5.20.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.20.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

5.20.2.3.3.3 DELETE

This method enables an AF to request the deletion of an Individual MBS Session resource in the NEF.

This method shall support the URI query parameters specified in table 5.20.2.3.3.3-1.

Table 5.20.2.3.3.3-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.20.2.3.3.3-2 and the response data structures and response codes specified in table 5.20.2.3.3.3-3.

Table 5.20.2.3.3.3-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.20.2.3.3.3-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response Codes	Description
n/a			204 No Content	Successful response. The Individual MBS Session resource was successfully deleted.
			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].

NOTE 1: The mandatory HTTP error status code for the DELETE method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.

Editor's Note: Errors are FFS.

Table 5.20.2.3.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located on an alternative service instance within the same NEF. Or the same URI, if a request is redirected to the same target resource via a different SCP.

Table 5.20.2.3.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located on an alternative service instance within the same NEF. Or the same URI, if a request is redirected to the same target resource via a different SCP.

5.20.2.4 Resource: MBS Session Subscriptions

5.20.2.4.1 Introduction

This resource represents the collection of MBS Session Subscriptions managed by the NEF.

This resource is modelled with the Collection resource archetype (see subclause C.2 of 3GPP TS 29.501 [3]).

5.20.2.4.2 Resource Definition

Resource URI: {apiRoot}/3gpp-mbs-session/v1/mbs-sessions/subscriptions

This resource shall support the resource URI variables defined in table 5.20.2.4.2-1.

Table 5.20.2.4.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	String	See subclause 5.20.1.

5.20.2.4.3 Resource Methods

5.20.2.4.3.1 GET

This method enables an AF to request to retrieve all the MBS Session Subscription resources managed by the NEF.

This method shall support the URI query parameters specified in table 5.20.2.4.3.1-1.

Table 5.20.2.4.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.20.2.4.3.1-2 and the response data structures and response codes specified in table 5.20.2.4.3.1-3.

Table 5.20.2.4.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.20.2.4.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(MbsSessionSubsc)	M	1..N	200 OK	Successful case. All the Individual MBS Session Subscription resources managed by the NEF are returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status code for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Editor's Note: Errors are FFS

Table 5.20.2.4.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative target URI located in an alternative NEF.

Table 5.20.2.4.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative target URI of the resource located in an alternative NEF.

5.20.2.4.3.2 POST

This method enables an AF to request the creation of an MBS Session Subscription resource at the NEF.

This method shall support the URI query parameters specified in table 5.20.2.4.3.2-1.

Table 5.20.2.4.3.2-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.20.2.4.3.2-2 and the response data structures and response codes specified in table 5.20.2.4.3.2-3.

Table 5.20.2.4.3.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MbsSessionSubsc	M	1	Representation of the MBS session to be created in the NEF.

Table 5.20.2.4.3.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MbsSessionSubsc	M	1	201 Created	Successful case. A representation of the created Individual MBS Session Subscription resource is returned. The URI of the created resource shall be returned in an HTTP "Location" header.
NOTE: The mandatory HTTP error status code for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Editor's Note: Errors are FFS

Table 5.20.2.4.3.2-4: Headers supported by the 201 response code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-mbs-session/v1/mbs-sessions/subscriptions/{subscriptionId}

5.20.2.5 Resource: Individual MBS Session Subscription

5.20.2.5.1 Introduction

This resource represents an Individual MBS Session Subscription managed by the NEF.

This resource is modelled with the Document resource archetype (see subclause C.2 of 3GPP TS 29.501 [3]).

5.20.2.5.2 Resource Definition

Resource URI: {apiRoot}/3gpp-mbs-session/v1/mbs-sessions/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 5.20.2.4.2-1.

Table 5.20.2.5.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	String	See subclause 5.20.1.
subscriptionId	String	Identifier of the subscription.

5.20.2.5.3 Resource Methods

5.20.2.5.3.1 GET

This method enables an AF to request to retrieve an Individual MBS Session Subscription resource managed by the NEF.

This method shall support the URI query parameters specified in table 5.20.2.5.3.1-1.

Table 5.20.2.5.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.20.2.5.3.1-2 and the response data structures and response codes specified in table 5.20.2.5.3.1-3.

Table 5.20.2.5.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.20.2.5.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MbsSessionSubsc	M	1	200 OK	Successful case. All the Individual MBS Session Subscription resources managed by the NEF is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status code for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Editor's Note: Errors are FFS

Table 5.20.2.5.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative target URI located in an alternative NEF.

Table 5.20.2.5.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative target URI of the resource located in an alternative NEF.

5.20.2.5.3.2 DELETE

This method enables an AF to request the deletion of an Individual MBS Session Subscription resource at the NEF.

This method shall support the URI query parameters specified in table 5.20.2.5.3.2-1.

Table 5.20.2.5.3.2-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.20.2.5.3.2-2 and the response data structures and response codes specified in table 5.20.2.5.3.2-3.

Table 5.20.2.5.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 5.20.2.5.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The concerned Individual MBS Session Subscription resource was successfully deleted.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status code for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Editor's notes: Errors are FFS

Table 5.20.2.5.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative target URI located in an alternative NEF.

Table 5.20.2.5.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative target URI of the resource located in an alternative NEF.

5.20.3 Custom Operations without associated resources

There are no customoperations without associated resources defined for this API in this release of the specification.

5.20.4 Notifications

5.20.4.1 General

Notifications shall comply to subclause 5.2.5 of 3GPP TS 29.122 [4].

Table 5.20.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
MBS Session Status Notification	{notificationUri}	POST	Enables to notify a previously subscribed AF on MBS session status information.

5.20.4.2 MBS Session Status Notification

5.20.4.2.1 Description

The MBS Session Status Notification is used by the NEF to report MBS session status information to a subscribed AF.

5.20.4.2.2 Target URI

The Callback URI "{notificationUri}" shall be used with the callback URI variables defined in table 5.20.4.2.2-1.

Table 5.20.4.2.2-1: Callback URI variables

Name	Data type	Definition
notificationUri	Uri	Callback reference provided by the AF during the creation/modification of the subscription.

5.20.4.2.3 Operation Definition

5.20.4.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.20.4.2.3.1-1 and the response data structures and response codes specified in table 5.20.4.2.3.1-2.

Table 5.20.4.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MbsSessionStatusNotif	M	1	Represents the MBS Session Status information to be reported to the AF.

Table 5.20.4.2.3.1-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The MBS Session Status notification is successfully received.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AF where the notification should be sent. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.20.4.2.3.1-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI representing the end point of an alternative AF towards which the notification should be redirected.

Table 5.20.4.2.3.1-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI representing the end point of an alternative AF towards which the notification should be redirected.

5.4.2.2.3.2 Notification via Websocket

If supported by both AF and NEF and successfully negotiated, the MBS Session Status Notification may alternatively be delivered through the Websocket mechanism as defined in subclause 5.2.5.4 of 3GPP TS 29.122 [4].

5.20.5 Data Model

5.20.5.1 General

This subclause specifies the application data model supported by the MBSSession API. Table 5.20.5.1-1 specifies the data types defined for the MBSSession API.

Table 5.20.5.1-1: MBSSession specific Data Types

Data type	Subclause defined	Description	Applicability
MbsSessionCreateReq	5.20.5.2.2	Represents the full set of parameters to initiate a TMGI(s) allocation request or the refresh of the expiry time of already allocated TMGI(s).	
MbsSessionCreateResp	5.20.5.2.3	Represents TMGI(s) allocation information or the refreshed expiry time for already allocated TMGI(s).	
MbsSessionSubsc	5.20.5.2.4	Represents an MBS Session Subscription.	
MbsSessionStatusNotif	5.20.5.2.5	Represents an MBS Session Status notification.	

Table 5.20.5.1-2 specifies data types re-used by the MBSSession API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the MBSSession API.

Table 5.20.5.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
DateTime	3GPP TS 29.122 [4]	Date and time	
MbsSession	3GPP TS 29.571 [8]	MBS session	
MbsSessionId	3GPP TS 29.571 [8]	MBS Session Identifier	
PatchItem	3GPP TS 29.571 [8]	Represents the requested modifications to a resource via the PATCH method.	
MbsSessionEventReportList	3GPP TS 29.571 [8]	MBS Session Event Report List	
MbsSessionSubscription	3GPP TS 29.571 [8]	MBS Session Subscription	
Tmgi	3GPP TS 29.571 [8]	TMGI	
TunnelAddress	3GPP TS 29.571 [8]	Tunnel Address (UDP/IP)	
Uri	3GPP TS 29.122 [4]	URI	

5.20.5.2 Structured data types

5.20.5.2.1 Introduction

This subclause defines the structures to be used in resource representations.

5.20.5.2.2 Type: MbsSessionCreateReq

Table 5.20.5.2.2-1: Definition of type MbsSessionCreateReq

Attribute name	Data type	P	Cardinality	Description	Applicability
afId	string	M	1	Contains the identifier of the AF that is sending the request.	
mbsSession	MbsSession	M	1	MBS session to be created.	

Editor's Note: It is FFS whether the MbsSession data type can be reused here or a new dedicated data type needs to be defined.

5.20.5.2.3 Type: MbsSessionCreateRsp

Table 5.20.5.2.3-1: Definition of type CreateRspData

Attribute name	Data type	P	Cardinality	Description	Applicability
mbsSession	MbsSession	M	1	Represents the created MBS session.	

Editor's Note: It is FFS whether immediate event reports may be included in the response.

5.20.5.2.4 Type: MbsSessionSubsc

Table 5.20.5.2.4-1: Definition of type MbsSessionSubsc

Attribute name	Data type	P	Cardinality	Description	Applicability
afId	string	M	1	Contains the identifier of the AF that is sending the request.	
subscription	MbsSessionSubscription	M	1	MBS Session Status subscription to be created	

5.20.5.2.5 Type: MbsSessionStatusNotif

Table 5.20.5.2.5-1: Definition of type MbsSessionStatusNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
eventList	MbsSessionEventReportList	M	1	Reported MBS session events	

5.20.5.3 Simple data types and enumerations

5.20.5.3.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

5.20.5.3.2 Simple data types

The simple data types defined in table 5.20.5.3.2-1 shall be supported.

Table 5.20.5.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

5.20.6 Used Features

The table below defines the features applicable to the MBSSession API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.20.6-1: Features used by MBSSession API

Feature number	Feature Name	Description

5.20.7 Error handling

5.20.7.1 General

HTTP error handling shall be supported as specified in subclause 5.2.6 of 3GPP TS 29.122 [4].

In addition, the requirements in the following subclauses shall apply.

5.20.7.2 Protocol Errors

In this Release of the specification, there are no additional protocol errors applicable for the MBSSession API.

5.20.7.3 Application Errors

The application errors defined for the MBSSession API are listed in table 5.20.7.3-1.

Table 5.20.7.3-1: Application errors

Application Error	HTTP status code	Description
TRANS_RESOURCE_RES_FAILURE	500 Internal Server Error	Indicates that the MBS Session creation failure due to unable to reserve the transmission resources.

5.21 EASDeployment API

5.21.1 Resources

5.21.1.1 Overview

All resource URIs of this API should have the following root:

{apiRoot}/3gpp-eas-deployment/v1

"apiRoot" is set as described in subclause 5.2.4 in 3GPP TS 29.122 [4]. "apiName" shall be set to "3gpp-eas-deployment" 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 5.21.1.1-1 and the resources and HTTP methods used for AF provisioned EAS Deployment information management in the northbound EASDeployment API.

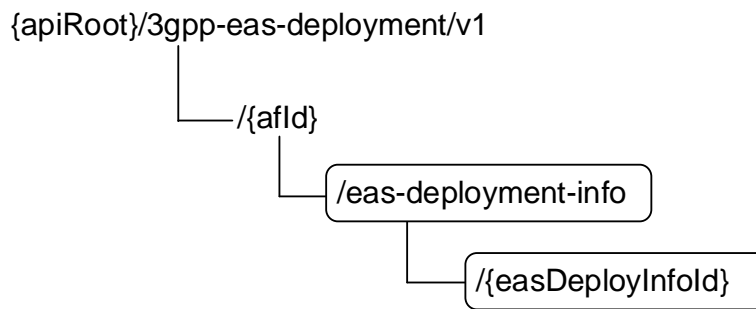


Figure 5.21.1.1-1: Resource URI structure of the northbound EASDeployment API

Table 5.21.1.1-1 provides an overview of the resources and HTTP methods applicable for the northbound EASDeployment API.

Table 5.21.1.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
EAS Deployment Information	/{afld}/eas-deployment-info	GET	Read all EAS Deployment information for a given AF.
		POST	Create a new Individual EAS Deployment information resource.
Individual EAS Deployment Information	/{afld}/eas-deployment-info/{easDeployInfld}	GET	Reads an active Individual EAS Deployment Information resource.
		PUT	Update an existing Individual EAS Deployment Information resource.
		DELETE	Deletes an existing Individual EAS Deployment Information resource.

5.21.1.2 Resource: EAS Deployment Information

5.21.1.2.1 Introduction

This resource allows an AF to request the creation of a new Individual EAS Deployment Information resource.

5.21.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-eas-deployment/v1/{afld}/eas-deployment-info**

This resource shall support the resource URI variables defined in table 5.21.1.2.2-1.

Table 5.21.1.2.2-1: 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.

5.21.1.2.3 Resource Methods

5.21.1.2.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.21.1.2.2.

5.21.1.2.3.2 GET

The GET method allows to read all active EAS Deployment information for a given AF and subscription. 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 5.21.1.2.3.2-1.

Table 5.21.1.2.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.21.1.2.3.2-2, the response data structures and response codes specified in table 5.21.1.2.3.2-3, and the location headers specified in table 5.21.1.2.3.2-4 and table 5.21.1.2.3.2-5.

Table 5.21.1.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.21.1.2.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(EasDeploymentInfo)	M	0..N	200 OK	The configuration information for the AF in the request URI are returned.
N/A			307 Temporary Redirect	Temporary redirection, during EAS deployment information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during EAS deployment information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.21.1.2.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.21.1.2.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative NEF.

5.21.1.2.3.3 POST

The POST method creates a new resource of Individual EAS Deployment Information 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 5.21.1.2.3.3-1, the response data structures and response codes specified in table 5.21.1.2.3.3-2, and the Location Headers specified in table 5.21.1.2.3.3-3.

Table 5.21.1.2.3.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
EasDeployInfo	M	1	EAS Deployment Information, indicates how edge services are deployed in each Local DN.

Table 5.21.1.2.3.3-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
EasDeployInfo	M	1	201 Created	The Individual EAS Deployment Information 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 5.21.1.2.3.3-3: Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-eas-deployment/v1/{afld}/eas-deployment-info/{easDeployInfoId}

5.21.1.3 Resource: Individual EAS Deployment Information

5.21.1.3.1 Introduction

This resource allows an AF to read, update or delete an existing Individual EAS Deployment Information.

5.21.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-eas-deployment/v1/{afld}/eas-deployment-info/{easDeployInfoId}

This resource shall support the resource URI variables defined in table 5.21.1.3.2-1.

Table 5.21.1.3.2-1: 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.
easDeployInfoId	string	Identifier of the EAS Deployment Information formatted according to IETF RFC 3986 [44].

5.21.1.3.3 Resource Methods

5.21.1.3.3.1 General

The following subclauses specify the resource methods supported by the resource as described in subclause 5.21.1.3.2.

5.21.1.3.3.2 GET

The GET method allows to read the existing EAS Deployment Information for a given AF and a given EAS Deployment Information 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 5.21.1.3.3.2-1.

Table 5.21.1.3.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.21.1.3.3.2-2, the response data structures and response codes specified in table 5.21.1.3.3.2-3, and the Location Headers specified in table 5.21.1.3.3.2-4 and table 5.21.1.3.3.2-5.

Table 5.21.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.21.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
EasDeployInfo	M	1	200 OK	Successful case. The exposure information of an existing Individual EAS Deployment Information in the request URI is returned.
N/A			307 Temporary Redirect	Temporary redirection, during the EAS Deployment Information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during the EAS Deployment Information retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.21.1.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.21.1.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

5.21.1.3.3.3 PUT

The PUT method is used to modify an existing Individual EAS Deployment Information resource. The AF shall initiate the HTTP PUT request message and the NEF shall respond to the message.

This method shall support the URI query parameters specified in table 5.21.1.3.3.3-1.

Table 5.21.1.3.3.3-1: URI query parameters supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 5.21.1.3.3.3-2, the response data structures and response codes specified in table 5.21.1.3.3.3-3, and the Location Headers specified in table 5.21.1.3.3.3-4 and table 5.21.1.3.3.3-5.

Table 5.21.1.3.3.3-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
EasDeployInfo	M	1	Modify the Individual EAS Deployment Information resource.

Table 5.21.1.3.3.3-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
EasDeployInfo	M	1	200 OK	Successful case. The exposure information of the updated EAS Deployment Information.
N/A			204 No Content	The EAS Deployment change was updated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during the EAS Deployment Information modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during the EAS Deployment Information modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.21.1.3.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.21.1.3.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative NEF.

5.21.1.3.3.4 DELETE

The DELETE method deletes an existing Individual EAS Deployment Information resource. 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 5.21.1.3.3.4-1.

Table 5.21.1.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
N/A				

This method shall support the request data structures specified in table 5.21.1.3.3.4-2, the response data structures and response codes specified in table 5.21.1.3.3.4-3, and the Location Headers specified in table 5.21.1.3.3.4-4 and table 5.21.1.3.3.4-5.

Table 5.21.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
N/A			

Table 5.21.1.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
N/A			204 No Content	The Individual EAS Deployment Information resource was terminated successfully.
N/A			307 Temporary Redirect	Temporary redirection, during the termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
N/A			308 Permanent Redirect	Permanent redirection, during the termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in subclause 5.2.10 of 3GPP TS 29.122 [4].
NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply.				

Table 5.21.1.3.3.4-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

Table 5.21.1.3.3.4-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NEF.

5.21.2 Custom Operations without associated resources

None.

5.21.3 Notifications

None.

5.21.4 Data Model

5.21.4.1 General

This subclause specifies the application data model supported by the EASDeployment API. Table 5.21.4.1-1 specifies the data types defined for the EASDeployment API.

Table 5.21.4.1-1: EASDeployment API specific Data Types

Data type	Subclause defined	Description	Applicability
EasDeployInfo	5.21.4.3.2	EAS Deployment Information, indicates how edge services are deployed in each Local DN.	
DnailInformation	5.21.4.3.3	list of DNS server identifier and/or IP address(s) of the EAS in the local DN for the DNAI.	
DnsServerIdentifier	5.21.4.3.4	DNS server identifier (consisting of IP address and port).	

5.21.4.2 Reused data types

The data types reused by the EASDeployment API from other specifications are listed in table 5.21.4.2-1.

Table 5.21.4.2-1: Re-used Data Types

Data type	Reference	Comments
Dnai	3GPP TS 29.571 [8]	Identifies a DNAI.
Dnn	3GPP TS 29.571 [8]	Identifies a DNN.
ExternalGroupId	3GPP TS 29.122 [4]	External Group Identifier for a user group.
Fqdn	3GPP TS 29.571 [8]	Identifies the FQDN.
IpAddr	3GPP TS 29.571 [8]	IP Address.
Snssai	3GPP TS 29.571 [8]	Identifies the S-NSSAI.
UInteger	3GPP TS 29.571 [8]	Unsigned integer.
Link	3GPP TS 29.122 [4]	Identifies a referenced resource.

5.21.4.3 Structured data types

5.21.4.3.1 Introduction

This clause defines the structured data types to be used in resource representations.

5.21.4.3.2 Type: EasDeployInfo

Table 5.21.4.3.2-1: Definition of type EasDeployInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
self	Link	C	0..1	Identifies the individual EAS Deployment information resource. Shall be present in the HTTP GET response when reading all the configurations for an AF.	
afServiceId	string	O	0..1	Identifies a service on behalf of which the AF is issuing the request.	
fqdns	array(Fqdn)	M	1..N	Supported FQDN(s) for application(s) deployed in the Local part of the DN.	
appld	string	O	0..1	Identifies the application for which the EAS Deployment Information corresponds to.	
dnn	Dnn	O	0..1	DNN for the EAS Deployment Information.	
snsai	Snsai	O	0..1	S-NSSAI for the EAS Deployment Information.	
exterGroupId	ExternalGroupId	O	0..1	External Group ID for the EAS Deployment Information.	
dnailfos	map(DnailInformation)	O	1..N	list of DNS server identifier (consisting of IP address and port) and/or IP address(s) of the EAS in the local DN for each DNAI. The key of map is the DNAI.	

5.21.4.3.3 Type: DnailInformation

Table 5.21.4.3.2-1: Definition of type DnailInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
dnai	Dnai	M	1	Identify the DNAI.	
dnsServIds	array(DnsServerIdentifier)	C	0..N	list of DNS server identifier (consisting of IP address and port) for each DNAI.	
easIpAddrs	array(IpAddr)	C	0..N	IP address(s) of the EASs in the local DN for each DNAI.	

NOTE: At least one of the "dnsServIds" or "easIpAddrs" attribute shall be provided.

5.21.4.3.4 Type: DnsServerIdentifier

Table 5.21.4.3.2-1: Definition of type DnsServerIdentifier

Attribute name	Data type	P	Cardinality	Description	Applicability
dnsServIpAddr	IpAddr	M	1	DNS server IP address.	
portNumber	UInteger	M	1	DNS port number.	

5.21.4.4 Simple data types and enumerations

5.21.4.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

5.21.4.4.2 Simple data types

The simple data types defined in table 5.21.4.4.2-1 shall be supported.

Table 5.21.4.4.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6 Security

TLS 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-3/3e reference points;
- the API publishing function and related APIs over CAPIF-4/4e reference point;
- the API management function and related APIs over CAPIF-5/5e 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-3/3e, CAPIF-4/4e and CAPIF-5/5e 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 Specification [5] and provides corresponding representations of all APIs defined in the present specification.

NOTE 1: An OpenAPIs representation embeds JSON Schema representations of HTTP message bodies.

This Annex shall take precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API(s).

NOTE 2: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification files contained in this 3GPP Technical Specification are available on a Git-based repository that uses the GitLab software version control system (see clause 5B of the 3GPP TR 21.900 [21] and subclause 5.3.1 of the 3GPP TS 29.501 [32] for further information).

A.2 TrafficInfluence API

```

openapi: 3.0.0
info:
  title: 3gpp-traffic-influence
  version: 1.2.0-alpha.5
  description: |
    API for AF traffic influence
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}/3gpp-traffic-influence/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
    get:
      summary: read all of the active subscriptions for the AF
      tags:
        - Traffic Influence Subscription
      responses:
        '200':
          description: OK.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/TrafficInfluSub'
```

```

'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'406':
  $ref: 'TS29122_CommonData.yaml#/components/responses/406'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

post:
  summary: Creates a new subscription resource
  tags:
    - Traffic Influence Subscription
  requestBody:
    description: Request to create a new subscription resource
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/TrafficInfluSub'
  callbacks:
    notificationDestination:
      '{request.body#/notificationDestination}':
        post:
          requestBody: # contents of the callback message
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/EventNotification'
          callbacks:
            afAcknowledgement:
              '{request.body#/afAckUri}':
                post:
                  requestBody: # contents of the callback message
                    required: true
                    content:
                      application/json:
                        schema:
                          $ref: '#/components/schemas/AfAckInfo'
          responses:
            '204':
              description: No Content (successful acknowledgement)
            '307':
              $ref: 'TS29122_CommonData.yaml#/components/responses/307'
            '308':
              $ref: 'TS29122_CommonData.yaml#/components/responses/308'
            '400':
              $ref: 'TS29122_CommonData.yaml#/components/responses/400'
            '401':
              $ref: 'TS29122_CommonData.yaml#/components/responses/401'
            '403':
              $ref: 'TS29122_CommonData.yaml#/components/responses/403'
            '404':
              $ref: 'TS29122_CommonData.yaml#/components/responses/404'
            '411':
              $ref: 'TS29122_CommonData.yaml#/components/responses/411'
            '413':
              $ref: 'TS29122_CommonData.yaml#/components/responses/413'
            '415':
              $ref: 'TS29122_CommonData.yaml#/components/responses/415'
            '429':
              $ref: 'TS29122_CommonData.yaml#/components/responses/429'
            '500':

```



```

        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    responses:
      '204':
        description: No Content (successful notification)
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  responses:
    '201':
      description: Created (Successful creation of subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/TrafficInfluSub'
      headers:
        Location:
          description: Contains the URI of the newly created resource.
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  /{afId}/subscriptions/{subscriptionId}:
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string

```

```

- name: subscriptionId
  in: path
  description: Identifier of the subscription resource
  required: true
  schema:
    type: string
get:
  summary: read an active subscriptions for the SCS/AS and the subscription Id
  tags:
    - Individual Traffic Influence Subscription
  responses:
    '200':
      description: OK (Successful get the active subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/TrafficInfluSub'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29122_CommonData.yaml#/components/responses/406'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
put:
  summary: Updates/replaces an existing subscription resource
  tags:
    - Individual Traffic Influence Subscription
  requestBody:
    description: Parameters to update/replace the existing subscription
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/TrafficInfluSub'
  responses:
    '200':
      description: OK (Successful update of the subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/TrafficInfluSub'
    '204':
      description: No Content
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'

```

```

'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

patch:
  summary: Updates/replaces an existing subscription resource
  tags:
    - Individual Traffic Influence Subscription
  requestBody:
    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/TrafficInfluSubPatch'
  responses:
    '200':
      description: OK. The subscription was modified successfully.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/TrafficInfluSub'
    '204':
      description: No Content
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing subscription
  tags:
    - Individual Traffic Influence Subscription
  responses:
    '204':
      description: No Content (Successful deletion of the existing subscription)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'

```

```

    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    TrafficInfluSub:
      description: Represents a traffic influence subscription.
      type: object
      properties:
        afServiceId:
          type: string
          description: Identifies a service on behalf of which the AF is issuing the request.
        afAppId:
          type: string
          description: Identifies an application.
        afTransId:
          type: string
          description: Identifies an NEF Northbound interface transaction, generated by the AF.
        appReloInd:
          type: boolean
          description: >
            Identifies whether an application can be relocated once a location of
            the application has been selected.
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        snssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        externalGroupId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        anyUeInd:
          type: boolean
          description: >
            Identifies whether the AF request applies to any UE. This attribute shall
            set to "true" if applicable for any UE, otherwise, set to "false".
        subscribedEvents:
          type: array
          items:
            $ref: '#/components/schemas/SubscribedEvent'
          minItems: 1
          description: Identifies the requirement to be notified of the event(s).
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        ipv4Addr:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Ipv4Addr'
        ipDomain:
          type: string
        ipv6Addr:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Ipv6Addr'
        macAddr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
        dnaiChgType:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DnaiChangeType'
        notificationDestination:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        requestTestNotification:
          type: boolean
          description: >
            Set to true by the SCS/AS to request the NEF to send a test notification
            as defined in subclause 5.2.5.3. Set to false or omitted otherwise.
        websocketNotifConfig:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsocketNotifConfig'
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        trafficFilters:
          type: array
          items:
            $ref: 'TS29122_CommonData.yaml#/components/schemas/FlowInfo'
          minItems: 1
          description: Identifies IP packet filters.

```

```

ethTrafficFilters:
  type: array
  items:
    $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'
  minItems: 1
  description: Identifies Ethernet packet filters.
trafficRoutes:
  type: array
  items:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
  minItems: 1
  description: Identifies the N6 traffic routing requirement.
tfcCorrInd:
  type: boolean
tempValidities:
  type: array
  items:
    $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/TemporalValidity'
validGeoZoneIds:
  type: array
  items:
    type: string
  minItems: 1
  description: >
    Identifies a geographic zone that the AF request applies only to the traffic
    of UE(s) located in this specific zone.
  deprecated: true
geoAreas:
  type: array
  items:
    $ref: 'TS29522_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'
  minItems: 1
  description: Identifies geographical areas within which the AF request applies.
afAckInd:
  type: boolean
addrPreserInd:
  type: boolean
simConnInd:
  type: boolean
  description: >
    Indicates whether simultaneous connectivity should be temporarily
    maintained for the source and target PSA.
simConnTerm:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
maxAllowedUpLat:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
easIpReplaceInfos:
  type: array
  items:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/EasIpReplacementInfo'
  minItems: 1
  description: Contains EAS IP replacement information.
easRedisInd:
  type: boolean
  description: Indicates the EAS rediscovery is required for the application if it is
included and set to "true".
suppFeat:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
allof:
  - oneOf:
    - required: [afAppId]
    - required: [trafficFilters]
    - required: [ethTrafficFilters]
  - oneOf:
    - required: [ipv4Addr]
    - required: [ipv6Addr]
    - required: [macAddr]
    - required: [gpsi]
    - required: [externalGroupId]
    - required: [anyUeInd]
anyOf:
  - not:
    required: [subscribedEvents]
  - required: [notificationDestination]
TrafficInfluSubPatch:
  description: >
    Represents parameters to request the modification of a traffic influence
    subscription resource.

```

```

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
    deprecated: true
  geoAreas:
    type: array
    items:
      $ref: 'TS29522_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'
    minItems: 1
    description: Identifies geographical areas within which the AF request applies.
    nullable: true
  afAckInd:
    type: boolean
    nullable: true
  addrPreserInd:
    type: boolean
    nullable: true
  simConnInd:
    type: boolean
    description: >
      Indicates whether simultaneous connectivity should be temporarily maintained
      for the source and target PSA.
  simConnTerm:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
  maxAllowedUpLat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UintegerRm'
  easIpReplaceInfos:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/EasIpReplacementInfo'
    minItems: 1
    description: Contains EAS IP replacement information.
    nullable: true
  easRedisInd:
    type: boolean
    description: Indicates the EAS rediscovery is required for the application if it is
    included and set to "true".

```

```

    notificationDestination:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
EventNotification:
  description: Represents a traffic influence event notification.
  type: object
  properties:
    afTransId:
      type: string
      description: Identifies an NEF Northbound interface transaction, generated by the AF.
    dnaiChgType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DnaiChangeType'
    sourceTrafficRoute:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
    subscribedEvent:
      $ref: '#/components/schemas/SubscribedEvent'
    targetTrafficRoute:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
    sourceDnai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    targetDnai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    srcUeIpv4Addr:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Ipv4Addr'
    srcUeIpv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    tgtUeIpv4Addr:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Ipv4Addr'
    tgtUeIpv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
    ueMac:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
    afAckUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
  required:
    - dnaiChgType
    - subscribedEvent
AfResultInfo:
  description: Identifies the result of application layer handling.
  type: object
  properties:
    afStatus:
      $ref: '#/components/schemas/AfResultStatus'
    trafficRoute:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RouteToLocation'
    upBuffInd:
      type: boolean
      description: >
        If present and set to "true" it indicates that buffering of uplink traffic
        to the target DNAI is needed.
    easIpReplaceInfos:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/EasIpReplacementInfo'
      minItems: 1
      description: Contains EAS IP replacement information.
  required:
    - afStatus
AfAckInfo:
  description: Represents acknowledgement information of a traffic influence event notification.
  type: object
  properties:
    afTransId:
      type: string
    ackResult:
      $ref: '#/components/schemas/AfResultInfo'
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  required:
    - ackResult
SubscribedEvent:
  anyOf:
    - type: string
      enum:
        - UP_PATH_CHANGE
    - type: string
  description: |

```

Possible values are:

- UP_PATH_CHANGE: The AF requests to be notified when the UP path changes for the PDU session.

AfResultStatus:

anyOf:

- type: string
- enum:
 - SUCCESS
 - TEMPORARY_CONGESTION
 - RELOC_NO_ALLOWED
 - OTHER
- type: string

description: |

Possible values are:

- SUCCESS: The application layer is ready or the relocation is completed.
- TEMPORARY_CONGESTION: The application relocation fails due to temporary congestion.
- RELOC_NO_ALLOWED: The application relocation fails because application relocation is not allowed.
- OTHER: The application relocation fails due to other reason.

A.3 NiddConfigurationTrigger API

```

openapi: 3.0.0
info:
  title: 3gpp-nidd-configuration-trigger
  version: 1.1.0-alpha.1
  description: |
    API for NIDD Configuration Trigger.
    © 2021, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V17.2.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /:
    post:
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/NiddConfigurationTrigger'
      responses:
        '200':
          description: Success
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/NiddConfigurationTriggerReply'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'

```



```

    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    NiddConfigurationTrigger:
      description: Represents a NIDD configuration trigger.
      type: object
      properties:
        afId:
          type: string
          description: Identifies the trigger receiving entity.
        nefId:
          type: string
          description: Identifies the trigger sending entity.
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - afId
        - nefId
        - gpsi
        - suppFeat
    NiddConfigurationTriggerReply:
      description: Represents a reply to a NIDD configuration trigger.
      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: 1.1.0-alpha.2
  description: |
    API for Analytics Exposure.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}/3gpp-analyticsexposure/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF

```

```

tags:
- Analytics Exposure Subscriptions
parameters:
- name: afId
  in: path
  description: Identifier of the AF
  required: true
  schema:
    type: string
- name: supp-feat
  in: query
  description: Features supported by the NF service consumer
  required: false
  schema:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
responses:
'200':
  description: OK (Successful get all of the active subscriptions for the AF)
  content:
    application/json:
      schema:
        type: array
        items:
          $ref: '#/components/schemas/AnalyticsExposureSubsc'
        minItems: 0
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'406':
  $ref: 'TS29122_CommonData.yaml#/components/responses/406'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

post:
summary: Creates a new subscription resource
tags:
- Analytics Exposure Subscriptions
parameters:
- name: afId
  in: path
  description: Identifier of the AF
  required: true
  schema:
    type: string
requestBody:
  description: new subscription creation
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/AnalyticsExposureSubsc'
callbacks:
notification:
  '{request.body#/notifUri}':
    post:
      requestBody: # contents of the callback message
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AnalyticsEventNotification'
      responses:
        '204':

```

```

        description: No Content (successful notification)
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'
responses:
  '201':
    description: Created (Successful creation)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AnalyticsExposureSubsc'
    headers:
      Location:
        description: Contains the URI of the newly created resource.
        required: true
        schema:
          type: string
  '204':
    description: >
      Successful case. The resource has been successfully created and no additional
      content is to be sent in the response message.
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
/{afId}/subscriptions/{subscriptionId}:
get:
  summary: read an active subscription for the AF and the subscription Id
  tags:
    - Individual Analytics Exposure Subscription
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:

```

```

    type: string
  - name: subscriptionId
    in: path
    description: Identifier of the subscription resource
    required: true
    schema:
      type: string
  - name: supp-feat
    in: query
    description: Features supported by the NF service consumer
    required: false
    schema:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
responses:
  '200':
    description: OK (Successful get the active subscription)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AnalyticsExposureSubsc'
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
  summary: Updates/replaces an existing subscription resource
  tags:
    - Individual Analytics Exposure Subscription
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  requestBody:
    description: Parameters to update/replace the existing subscription
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AnalyticsExposureSubsc'
  responses:
    '200':
      description: OK (Successful deletion of the existing subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AnalyticsExposureSubsc'
    '204':
      description: >
        Successful case. The resource has been successfully updated and no additional
        content is to be sent in the response message.

```

```

'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

delete:

summary: Deletes an already existing subscription

tags:

- Individual Analytics Exposure Subscription

parameters:

- name: afId
 - in: path
 - description: Identifier of the AF
 - required: true
 - schema:
 - type: string
- name: subscriptionId
 - in: path
 - description: Identifier of the subscription resource
 - required: true
 - schema:
 - type: string

responses:

```

'204':
  description: No Content (Successful deletion of the existing subscription)
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

/{afId}/fetch:

post:

summary: Fetch analytics information

tags:

- AnalyticsExposure API Fetch analytics information

parameters:

- name: afId
 - in: path
 - description: Identifier of the AF
 - required: true

```

    schema:
      type: string
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AnalyticsRequest'
  responses:
    '200':
      description: The requested information was returned successfully.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AnalyticsData'
    '204':
      description: No Content (The requested Analytics data does not exist)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    AnalyticsExposureSubsc:
      description: Represents an analytics exposure subscription.
      type: object
      properties:
        analyEventsSubs:
          type: array
          items:
            $ref: '#/components/schemas/AnalyticsEventSubsc'
          minItems: 1
        analyRepInfo:
          $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
        notifUri:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        notifId:
          type: string
        eventNotifis:
          type: array
          items:
            $ref: '#/components/schemas/AnalyticsEventNotif'
          minItems: 1
        failEventReports:
          type: array
          items:
            $ref: '#/components/schemas/AnalyticsFailureEventInfo'
          minItems: 1

```

```

    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    self:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
    requestTestNotification:
      type: boolean
      description: >
        Set to true by the AF to request the NEF to send a test notification
        as defined in subclause 5.2.5.3 of 3GPP TS 29.122. Set to false or omitted otherwise.
    websocketNotifConfig:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsocketNotifConfig'
  required:
  - analyEventsSubs
  - notifUri
  - notifId
AnalyticsEventNotification:
  description: Represents an analytics event(s) notification.
  type: object
  properties:
    notifId:
      type: string
    analyEventNotifs:
      type: array
      items:
        $ref: '#/components/schemas/AnalyticsEventNotif'
      minItems: 1
  required:
  - notifId
  - analyEventNotifs
AnalyticsEventNotif:
  description: Represents an analytics event to be reported.
  type: object
  properties:
    analyEvent:
      $ref: '#/components/schemas/AnalyticsEvent'
    expiry:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    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/QoSustainabilityExposure'
      minItems: 1
    disperInfos:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/DispersionInfo'
      minItems: 1
  required:
  - analyEvent
  - timeStamp
AnalyticsEventSubsc:

```

```

description: Represents a subscribed analytics event.
type: object
properties:
  analyEvent:
    $ref: '#/components/schemas/AnalyticsEvent'
  analyEventFilter:
    $ref: '#/components/schemas/AnalyticsEventFilterSubsc'
  tgtUe:
    $ref: '#/components/schemas/TargetUeId'
required:
  - analyEvent
AnalyticsEventFilterSubsc:
description: Represents an analytics event filter.
type: object
properties:
  nwPerfReqs:
    type: array
    items:
      $ref:
'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
  dnn:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
  excepRequs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/Exception'
    minItems: 1
  exptAnaType:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ExpectedAnalyticsType'
  exptUeBehav:
    $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/ExpectedUeBehaviourData'
  reptThlds:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ThresholdLevel'
    minItems: 1
  snssai:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
  qosReq:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/QosRequirement'
  qosFlowRetThds:
    type: array
    items:
      $ref:
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/RetainabilityThreshold'
    minItems: 1
  ranUeThrouThds:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
    minItems: 1
  disperReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/DispersionRequirement'
    minItems: 1
  extraReportReq:
    $ref:
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/EventReportingRequirement'
TargetUeId:
description: Represents the target UE(s) information.
type: object
properties:
  anyUeInd:
    type: boolean
  gpsi:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  exterGroupId:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
  UeMobilityExposure:

```



```

description: Represents a UE mobility information.
type: object
properties:
  ts:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
  recurringTime:
    $ref: 'TS29122_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'
  duration:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
  durationVariance:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
  locInfo:
    type: array
    items:
      $ref: '#/components/schemas/UELocationInfo'
    minItems: 1
  required:
    - duration
    - locInfo
UELocationInfo:
description: Represents a UE location information.
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:
description: Represents the parameters to request to retrieve analytics information.
type: object
properties:
  analyEvent:
    $ref: '#/components/schemas/AnalyticsEvent'
  analyEventFilter:
    $ref: '#/components/schemas/AnalyticsEventFilter'
  analyRep:
    $ref:
'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/EventReportingRequirement'
  tgtUe:
    $ref: '#/components/schemas/TargetUeId'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - analyEvent
    - suppFeat
AnalyticsEventFilter:
description: Represents analytics event filter information.
type: object
properties:
  locArea:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
  dnn:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
  nwPerfTypes:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NetworkPerfType'
    minItems: 1
  appIds:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
    minItems: 1
  excepIds:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ExceptionId'
    minItems: 1
  exptAnaType:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ExpectedAnalyticsType'
  exptUeBehav:
    $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/ExpectedUeBehaviourData'
  snssai:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'

```

```

    qosReq:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/QosRequirement'
AnalyticsData:
  description: Represents analytics data.
  type: object
  properties:
    expiry:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    ueMobilityInfos:
      type: array
      items:
        $ref: '#/components/schemas/UeMobilityExposure'
      minItems: 1
    ueCommInfos:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/UeCommunication'
      minItems: 1
    nwPerfInfos:
      type: array
      items:
        $ref: '#/components/schemas/NetworkPerfExposure'
      minItems: 1
    abnormalInfos:
      type: array
      items:
        $ref: '#/components/schemas/AbnormalExposure'
      minItems: 1
    congestInfos:
      type: array
      items:
        $ref: '#/components/schemas/CongestInfo'
      minItems: 1
    qosSustainInfos:
      type: array
      items:
        $ref: '#/components/schemas/QosSustainabilityExposure'
      minItems: 1
    disperInfos:
      type: array
      items:
        $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/DispersionInfo'
      minItems: 1
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - suppFeat
NetworkPerfExposure:
  description: Represents network performance information.
  type: object
  properties:
    locArea:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    nwPerfType:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NetworkPerfType'
    relativeRatio:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SamplingRatio'
    absoluteNum:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    confidence:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  required:
    - locArea
    - nwPerfType
AbnormalExposure:
  description: Represents a user's abnormal behavior information.
  type: object
  properties:
    gpsis:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      minItems: 1
    appId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
    excep:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/Exception'
  ratio:

```

```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/SamplingRatio'
  confidence:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  addtMeasInfo:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/AdditionalMeasurement'
  required:
    - excep
CongestInfo:
  description: Represents a UE's user data congestion information.
  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:
  description: >
    Represents data congestion analytics for transfer over the user plane,
    control plane or both.
  type: object
  properties:
    cngType:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/CongestionType'
    tmWdw:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
    nsi:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ThresholdLevel'
  confidence:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  required:
    - cngType
    - tmWdw
    - nsi
QoS Sustainability Exposure:
  description: Represents a QoS sustainability information.
  type: object
  properties:
    locArea:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    startTs:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    endTs:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    qosFlowRetThd:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/RetainabilityThreshold'
    ranUeThrouThd:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
  confidence:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  required:
    - locArea
    - startTs
    - endTs
AnalyticsFailureEventInfo:
  description: >
    Represents an event for which the subscription request was not successful
    and including the associated failure reason.
  type: object
  properties:
    event:
      $ref: '#/components/schemas/AnalyticsEvent'
    failureCode:
      $ref: '#/components/schemas/AnalyticsFailureCode'
  required:
    - event
    - failureCode
AnalyticsEvent:
  anyOf:
    - type: string
  enum:
    - UE_MOBILITY
    - UE_COMM

```

```

- ABNORMAL_BEHAVIOR
- CONGESTION
- NETWORK_PERFORMANCE
- QOS_SUSTAINABILITY
- DISPERSION
- 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.
- DISPERSION: The AF requests to be notified about analytics information of Dispersion
analytics.
AnalyticsFailureCode:
anyOf:
- type: string
enum:
- UNAVAILABLE_DATA
- BOTH_STAT_PRED_NOT_ALLOWED
- OTHER
- type: string
description: >
  This string provides forward-compatibility with future
  extensions to the enumeration but is not used to encode
  content defined in the present version of this API.
description: |
  Possible values are:
- UNAVAILABLE_DATA: The event is rejected since necessary data to perform the service is
unavailable.
- BOTH_STAT_PRED_NOT_ALLOWED: The event is rejected since the start time is in the past and
the end time is in the future, which means the NF service consumer requested both statistics and
prediction for the analytics.
- OTHER: The event is rejected due to other reasons.

```

A.5 5GLANParameterProvision API

```

openapi: 3.0.0
info:
  title: 3gpp-5gln-pp
  version: 1.1.0-alpha.3
  description: |
    API for 5G LAN Parameter Provision.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
- {}
- oAuth2ClientCredentials: []
servers:
- url: '{apiRoot}/3gpp-5gln-pp/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      tags:
        - 5GLAN Parameters Provision Subscriptions
      parameters:

```

```

- name: afId
  in: path
  description: Identifier of the AF
  required: true
  schema:
    type: string
responses:
  '200':
    description: OK (Successful get all of the active subscriptions for the AF)
    content:
      application/json:
        schema:
          type: array
          items:
            $ref: '#/components/schemas/5GLanParametersProvision'
          minItems: 0
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

post:
  summary: Creates a new subscription resource
  tags:
  - 5GLAN Parameters Provision Subscriptions
  parameters:
  - name: afId
    in: path
    description: Identifier of the AF
    required: true
    schema:
      type: string
  requestBody:
    description: new subscription creation
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/5GLanParametersProvision'
  responses:
  '201':
    description: Created (Successful creation)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/5GLanParametersProvision'
    headers:
      Location:
        description: Contains the URI of the newly created resource.
        required: true
        schema:
          type: string
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'

```

```

'411':
  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/subscriptions/{subscriptionId}:
get:
  summary: read an active subscription for the AF and the subscription Id
  tags:
    - Individual 5GLAN Parameters Provision Subscription
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  responses:
    '200':
      description: OK (Successful get the active subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/5GLANParametersProvision'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29122_CommonData.yaml#/components/responses/406'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
  summary: Updates/replaces an existing subscription resource
  tags:
    - Individual 5GLAN Parameters Provision Subscription
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true

```

```

    schema:
      type: string
  requestBody:
    description: Parameters to update/replace the existing subscription
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/5GLanParametersProvision'
  responses:
    '200':
      description: OK (Successful deletion of the existing subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/5GLanParametersProvision'
    '204':
      description: >
        Successful case. The resource has been successfully updated and no additional
        content is to be sent in the response message.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

patch:
  summary: Partial updates an existing subscription resource
  tags:
    - Individual 5GLAN Parameters Provision Subscription
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  requestBody:
    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/5GLanParametersProvisionPatch'
  responses:
    '200':
      description: OK. The subscription was modified successfully.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/5GLanParametersProvision'
    '204':

```

```

description: >
  Successful case. The resource has been successfully updated and no additional
  content is to be sent in the response message.
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

delete:

summary: Deletes an already existing subscription

tags:

- Individual 5GLAN Parameters Provision Subscription

parameters:

- name: afId
 - in: path
 - description: Identifier of the AF
 - required: true
 - schema:
 - type: string
- name: subscriptionId
 - in: path
 - description: Identifier of the subscription resource
 - required: true
 - schema:
 - type: string

responses:

```

'204':
  description: No Content (Successful deletion of the existing subscription)
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

```

tokenUrl: '{tokenUrl}'
scopes: {}

```



```

schemas:
  5GLanParametersProvision:
    description: Represents an individual 5G LAN parameters provision subscription resource.
    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:
    description: >
      Represents the 5G LAN parameters to request the modification of a subscription
      to provision parameters.
    type: object
    properties:
      5gLanParamsPatch:
        $ref: '#/components/schemas/5GLanParametersPatch'
  5GLanParameters:
    description: Represents 5G LAN service related parameters that need to be provisioned.
    type: object
    properties:
      exterGroupId:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
      gpsis:
        type: object
        additionalProperties:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        minProperties: 1
        description: >
          Contains the list of 5G VN Group members, each member is identified by GPSI.
          Any string value can be used as a key of the map.
      dnn:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
      aaaIpv4Addr:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
      aaaIpv6Addr:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
      aaaUsgs:
        type: array
        items:
          $ref: '#/components/schemas/AaaUsage'
        minItems: 1
      mtcProviderId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
      snssai:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
      sessionType:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionType'
      sessionTypes:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionType'
        minItems: 1
        description: Further allowed PDU Session types.
      appDesps:
        type: object
        additionalProperties:
          $ref: '#/components/schemas/AppDescriptor'
        minProperties: 1
        description: Describes the operation systems and the corresponding applications for each
operation systems. The key of map is osId.
    required:
      - exterGroupId
      - gpsis
      - dnn
      - snssai
      - sessionType
      - appDesps
  5GLanParametersPatch:
    description: Represents 5G LAN service related parameters that need to be modified.
    type: object
    properties:
      gpsis:

```

```

    type: object
    additionalProperties:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/GpsiRm'
    minProperties: 1
    description: >
      Contains the list of 5G VN Group members, each member is identified by GPSI.
      Any string value can be used as a key of the map.
  appDesps:
    type: object
    additionalProperties:
      $ref: '#/components/schemas/AppDescriptorRm'
    minProperties: 1
    description: >
      Describes the operation systems and the corresponding applications for
      each operation systems. The key of map is osId.
  AppDescriptor:
    description: Represents an operation system and the corresponding applications.
    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
        description: >
          Identifies applications that are running on the UE's operating system.
          Any string value can be used as a key of the map.
    required:
      - osId
      - appIds
  AppDescriptorRm:
    description: >
      Represents the same as the AppDescriptor data type but with the nullable:true
      property.
    type: object
    properties:
      appIds:
        type: object
        additionalProperties:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationIdRm'
        minProperties: 1
        description: >
          Identifies applications that are running on the UE's operating system.
          Any string value can be used as a key of the map.
  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: 1.1.0-alpha.2
  description: |
    API for applying BDT policy
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  externalDocs:
    description: >
      3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
    url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

```

```
security:
- {}
- oAuth2ClientCredentials: []
servers:
- url: '{apiRoot}/3gpp-applying-bdt-policy/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.

paths:
  /{afId}/subscriptions:
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
    get:
      summary: read all of the active subscriptions for the AF
      tags:
        - Applied BDT Policy Subscription
      responses:
        '200':
          description: OK.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/AppliedBdtPolicy'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    post:
      summary: Creates a new subscription resource
      tags:
        - Applied BDT Policy Subscription
      requestBody:
        description: Request to create a new subscription resource
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppliedBdtPolicy'
      responses:
        '201':
          description: Created (Successful creation of subscription)
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/AppliedBdtPolicy'
      headers:
        Location:
          description: Contains the URI of the newly created resource.
          required: true
```

```

    schema:
      type: string
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/subscriptions/{subscriptionId}:
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  get:
    summary: read an active subscriptions for the SCS/AS and the subscription Id
    tags:
      - Individual Applied BDT Policy Subscription
    responses:
      '200':
        description: OK (Successful get the active subscription)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppliedBdtPolicy'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  patch:
    summary: Updates/replaces an existing subscription resource
    tags:
      - Individual Applied BDT Policy Subscription
    requestBody:

```

```

    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/AppliedBdtPolicyPatch'
  responses:
    '200':
      description: OK. The subscription was modified successfully.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AppliedBdtPolicy'
    '204':
      description: No content. The subscription was modified successfully.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  delete:
    summary: Deletes an already existing subscription
    tags:
      - Individual Applied BDT Policy Subscription
    responses:
      '204':
        description: No Content (Successful deletion of the existing subscription)
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    AppliedBdtPolicy:

```

```

description: Represents an applied BDT policy.
type: object
properties:
  externalGroupId:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
  gpsi:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  bdtRefId:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/BdtReferenceId'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  self:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
required:
  - bdtRefId
  - suppFeat
oneOf:
  - required: [gpsi]
  - required: [externalGroupId]
AppliedBdtPolicyPatch:
description: >
  Represents the parameters to request the modification of a subscription to
  applied BDT policy.
type: object
properties:
  bdtRefId:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/BdtReferenceId'
required:
  - bdtRefId

```

A.7 IPTVConfiguration API

```

openapi: 3.0.0
info:
  title: 3gpp-iptvconfiguration
  version: 1.1.0-alpha.3
  description: |
    API for IPTV configuration.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}/3gpp-iptvconfiguration/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/configurations:
    get:
      summary: read all of the active configurations for the AF
      tags:
        - IPTV Configurations
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      responses:
        '200':
          description: OK (Successful get all of the active configurations for the AF)
          content:
            application/json:
              schema:
                type: array
                items:

```

```

    $ref: '#/components/schemas/IptvConfigData'
    minItems: 0
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

post:
  summary: Creates a new configuration resource
  tags:
    - IPTV Configurations
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
  requestBody:
    description: new configuration creation
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/IptvConfigData'
  responses:
    '201':
      description: Created (Successful creation of configuration)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/IptvConfigData'
      headers:
        Location:
          description: Contains the URI of the newly created resource.
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

```

/{afId}/configurations/{configurationId}:
get:
  summary: read an active configuration for the AF and the configuration Id
  tags:
    - Individual IPTV Configuration
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: configurationId
      in: path
      description: Identifier of the configuration resource
      required: true
      schema:
        type: string
  responses:
    '200':
      description: OK (Successful get the active configuration)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/IptvConfigData'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29122_CommonData.yaml#/components/responses/406'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
  summary: Updates/replaces an existing configuration resource
  tags:
    - Individual IPTV Configuration
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: configurationId
      in: path
      description: Identifier of the configuration resource
      required: true
      schema:
        type: string
  requestBody:
    description: Parameters to update/replace the existing configuration
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/IptvConfigData'
  responses:
    '200':
      description: OK (Successful deletion of the existing configuration)
      content:
        application/json:

```



```

    schema:
      $ref: '#/components/schemas/IptvConfigData'
  '204':
    description: >
      Successful case. The resource has been successfully updated and no additional
      content is to be sent in the response message.
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

patch:
  summary: Partial updates an existing configuration resource
  tags:
    - Individual IPTV Configuration
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: configurationId
      in: path
      description: Identifier of the configuration resource
      required: true
      schema:
        type: string
  requestBody:
    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/IptvConfigDataPatch'
  responses:
    '200':
      description: OK. The configuration was modified successfully.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/IptvConfigData'
    '204':
      description: >
        Successful case. The resource has been successfully updated and no additional
        content is to be sent in the response message.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':

```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

delete:

summary: Deletes an already existing configuration

tags:

- Individual IPTV Configuration

parameters:

- name: afId
 - in: path
 - description: Identifier of the AF
 - required: true
 - schema:
 - type: string
- name: configurationId
 - in: path
 - description: Identifier of the configuration resource
 - required: true
 - schema:
 - type: string

responses:

```

  '204':
    description: No Content (Successful deletion of the existing configuration)
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

components:

securitySchemes:

```

  oAuth2ClientCredentials:
    type: oauth2
    flows:
      clientCredentials:
        tokenUrl: '{tokenUrl}'
        scopes: {}

```

schemas:

```

  IptvConfigData:
    description: Represents an individual IPTV Configuration resource.
    type: object
    properties:
      self:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
      gpsi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      exterGroupId:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
      afAppId:
        type: string
      dnn:

```

```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
  snssai:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
  multiAccCtrls:
    type: object
    additionalProperties:
      $ref: '#/components/schemas/MulticastAccessControl'
    minProperties: 1
    description: >
      Identifies a list of multicast address access control information.
      Any string value can be used as a key of the map.
  mtcProviderId:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
  - afAppId
  - multiAccCtrls
  - suppFeat
IptvConfigDataPatch:
  description: >
    Represents the parameters to request the modification of an IPTV Configuration resource.
  type: object
  properties:
    multiAccCtrls:
      type: object
      additionalProperties:
        $ref: '#/components/schemas/MulticastAccessControl'
      minProperties: 1
      description: >
        Identifies a list of multicast address access control information.
        Any string value can be used as a key of the map.
MulticastAccessControl:
  description: Represents multicast address access control information.
  type: object
  properties:
    srcIpv4Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    srcIpv6Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
    multicastV4Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    multicastV6Addr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
    accStatus:
      $ref: '#/components/schemas/AccessRightStatus'
  required:
  - accStatus
AccessRightStatus:
  anyOf:
  - type: string
    enum:
    - FULLY_ALLOWED
    - PREVIEW_ALLOWED
    - NO_ALLOWED
  - type: string
  description: |
    Possible values are:
    - FULLY_ALLOWED: The User is fully allowed to access to the channel.
    - PREVIEW_ALLOWED: The User is preview allowed to access to the channel.
    - NO_ALLOWED: The User is not allowed to access to the channel.

```

A.8 LpiParameterProvision API

```

openapi: 3.0.0
info:
  title: 3gpp-lpi-pp
  version: 1.1.0-alpha.2
  description: |
    API for Location Privacy Indication Parameters Provisioning.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  externalDocs:
    description: >
      3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.

```

```

url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
- {}
- oAuth2ClientCredentials: []
servers:
- url: '{apiRoot}/3gpp-lpi-pp/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/provisionedLpis:
    get:
      summary: read all of the active LPI Parameters Provisioning resources for the AF
      tags:
      - LPI Parameters Provisionings
      parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      responses:
        '200':
          description: OK (Successful get all of the active resources for the AF)
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/LpiParametersProvision'
                minItems: 1
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    post:
      summary: Creates a new LPI Parameters Provisioning resource
      tags:
      - LPI Parameters Provisionings
      parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      requestBody:
        description: new resource creation
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LpiParametersProvision'
      responses:
        '201':
          description: Created (Successful creation)
          content:

```

```

    application/json:
      schema:
        $ref: '#/components/schemas/LpiParametersProvision'
    headers:
      Location:
        description: Contains the URI of the newly created resource.
        required: true
        schema:
          type: string
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/provisionedLpis/{provisionedLpiId}:
  get:
    summary: read an active LPI Parameters Provisioning resource for the AF and the provisioned
LPI Id
    tags:
      - Individual LPI Parameters Provisioning
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: provisionedLpiId
        in: path
        description: Identifier of the provisioned LPI parameter resource
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK (Successful get the active resource)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LpiParametersProvision'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'

```

```
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  put:
    summary: Updates/replaces an existing LPI Parameters Provisioning resource
    tags:
      - Individual LPI Parameters Provisioning
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: provisionedLpiId
        in: path
        description: Identifier of the provisioned LPI parameter resource
        required: true
        schema:
          type: string
    requestBody:
      description: Parameters to update/replace the existing resource
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/LpiParametersProvision'
    responses:
      '200':
        description: OK. The resource has been successfully updated and a representation of the
        updated resource is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LpiParametersProvision'
      '204':
        description: >
        Successful case. The resource has been successfully updated and no additional
        content is sent in the response message.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  patch:
    summary: Modifies an existing LPI Parameters Provisioning resource.
    tags:
      - Individual LPI Parameters Provisioning
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: provisionedLpiId
```

```

    in: path
    description: Identifier of the provisioned LPI parameter resource
    required: true
    schema:
      type: string
  requestBody:
    description: Parameters to modify the existing resource.
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/LpiParametersProvisionPatch'
  responses:
    '200':
      description: OK. The resource has been successfully modified and a representation of the
updated resource is returned.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/LpiParametersProvision'
    '204':
      description: Successful case. The resource has been successfully modified and no
additional content is sent in the response message.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing LPI Parameters Provisioning resource
  tags:
    - Individual LPI Parameters Provisioning
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: provisionedLpiId
      in: path
      description: Identifier of the provisioned LPI parameter resource
      required: true
      schema:
        type: string
  responses:
    '204':
      description: No Content (Successful deletion of the existing resource)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'

```

```

    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  components:
    securitySchemes:
      oAuth2ClientCredentials:
        type: oauth2
        flows:
          clientCredentials:
            tokenUrl: '{tokenUrl}'
            scopes: {}
    schemas:
      LpiParametersProvision:
        description: Represents an individual LPI Parameters Provisionings resource.
        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'
          mtcProviderId:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
          suppFeat:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
        required:
          - lpi
          - suppFeat
      LpiParametersProvisionPatch:
        description: Represents the parameters to modify an existing Individual LPI Parameters
        Provisionings resource.
        type: object
        properties:
          lpi:
            $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/Lpi'
          mtcProviderId:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'

```

A.9 ServiceParameter API

```

openapi: 3.0.0
info:
  title: 3gpp-service-parameter
  version: 1.1.0-alpha.3
  description: |
    API for AF service paramter
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  externalDocs:
    description: >
      3GPP TS 29.522 V17.5.0: 5G System; Network Exposure Function Northbound APIs.
    url: 'https://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
    parameters:
      - name: gpsi
        in: query
        description: The GPSI of the requested UE(s).
        required: false
        schema:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
          minItems: 1
      - name: ip-addr
        in: query
        description: The IP address(es) of the requested UE(s).
        required: false
        schema:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
          minItems: 1
      - name: ip-domain
        in: query
        description: >
          The IPv4 address domain identifier. The attribute may only be provided
          if IPv4 address is included in the ip-addr query parameter.
        required: false
        schema:
          type: string
      - name: mac-addr
        in: query
        description: The MAC address(es) of the requested UE(s).
        required: false
        schema:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
          minItems: 1
    responses:
      '200':
        description: OK.
        content:
          application/json:
            schema:
              type: array
              items:
                $ref: '#/components/schemas/ServiceParameterData'
              minItems: 0
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'

```

```

    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

post:
  summary: Creates a new subscription resource
  tags:
    - Service Parameter Subscriptions
  requestBody:
    description: Request to create a new subscription resource
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/ServiceParameterData'
  responses:
    '201':
      description: Created (Successful creation of subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ServiceParameterData'
      headers:
        Location:
          description: Contains the URI of the newly created resource.
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

callbacks:
  notificationDestination:
    '{$request.body#/notificationDestination}':
      post:
        requestBody:
          description: >
            Notifications upon AF Service Parameter Authorization Update,
            and/or AF subscribed event notification of the outcome related
            to the invocation of service parameters provisioning.
          required: true
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/AfNotification'
                minItems: 1
        responses:
          '204':
            description: Expected response to a successful callback processing without a body
          '307':
            $ref: 'TS29122_CommonData.yaml#/components/responses/307'
          '308':
            $ref: 'TS29122_CommonData.yaml#/components/responses/308'
          '400':
            $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          '401':
            $ref: 'TS29122_CommonData.yaml#/components/responses/401'
          '403':

```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/subscriptions/{subscriptionId}:
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  get:
    summary: read an active subscriptions for the SCS/AS and the subscription Id
    tags:
      - Individual Service Parameter Subscription
    responses:
      '200':
        description: OK (Successful get the active subscription)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ServiceParameterData'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  put:
    summary: Updates/replaces an existing subscription resource
    tags:
      - Individual Service Parameter Subscription
    requestBody:
      description: Parameters to update/replace the existing subscription
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ServiceParameterData'
    responses:

```

```

'200':
  description: OK (Successful update of the subscription)
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/ServiceParameterData'
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

patch:
  summary: Updates/replaces an existing subscription resource
  tags:
    - Individual Service Parameter Subscription
  requestBody:
    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/ServiceParameterDataPatch'
  responses:
    '200':
      description: OK. The subscription was modified successfully.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ServiceParameterData'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:

```

```

summary: Deletes an already existing subscription
tags:
  - Individual Service Parameter Subscription
responses:
  '204':
    description: No Content (Successful deletion of the existing subscription)
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

```

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
schemas:
  ServiceParameterData:
    description: Represents an individual Service Parameter subscription resource.
    type: object
    properties:
      afServiceId:
        type: string
        description: Identifies a service on behalf of which the AF is issuing the request.
      appId:
        type: string
        description: Identifies an application.
      dnn:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
      snssai:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
      externalGroupId:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
      anyUeInd:
        type: boolean
        description: >
          Identifies whether the AF request applies to any UE. This attribute
          shall set to "true" if applicable for any UE, otherwise, set to "false".
      gpsi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      ueIpv4:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
      ueIpv6:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
      ueMac:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
      self:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
      subNotifEvents:
        type: array
        items:
          $ref: '#/components/schemas/Event'
        minItems: 1
      notificationDestination:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      requestTestNotification:
        type: boolean
        description: >
          Set to true by the AF to request the NEF to send a test notification

```

as defined in subclause 5.2.5.3 of 3GPP TS 29.122. Set to false or omitted otherwise.

```

websockNotifConfig:
  $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsockNotifConfig'
paramOverPc5:
  $ref: '#/components/schemas/ParameterOverPc5'
paramOverUu:
  $ref: '#/components/schemas/ParameterOverUu'
paramForProSeDd:
  $ref: '#/components/schemas/ParamForProSeDd'
paramForProSeDc:
  $ref: '#/components/schemas/ParamForProSeDc'
paramForProSeU2NRelUe:
  $ref: '#/components/schemas/ParamForProSeU2NRelUe'
paramForProSeRemUe:
  $ref: '#/components/schemas/ParamForProSeRemUe'
urspGuidance:
  type: array
  items:
    $ref: '#/components/schemas/UrspRuleRequest'
  minItems: 1
  description: Contains the service parameter used to guide the URSP.
mtcProviderId:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
suppFeat:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
ServiceParameterDataPatch:
  description: >
    Represents the parameters to request the modification of a service parameter
    subscription resource.
  type: object
  properties:
    paramOverPc5:
      $ref: '#/components/schemas/ParameterOverPc5Rm'
    paramOverUu:
      $ref: '#/components/schemas/ParameterOverUuRm'
    paramForProSeDd:
      $ref: '#/components/schemas/ParamForProSeDdRm'
    paramForProSeDc:
      $ref: '#/components/schemas/ParamForProSeDcRm'
    paramForProSeU2NRelUe:
      $ref: '#/components/schemas/ParamForProSeU2NRelUeRm'
    paramForProSeRemUe:
      $ref: '#/components/schemas/ParamForProSeRemUeRm'
  urspGuidance:
    type: array
    items:
      $ref: '#/components/schemas/UrspRuleRequest'
    minItems: 1
    description: Contains the service parameter used to guide the URSP.
  subNotifEvents:
    type: array
    items:
      $ref: '#/components/schemas/Event'
    minItems: 1
    nullable: true
  notificationDestination:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
ParameterOverPc5:
  description: >
    Represents configuration parameters for V2X communications over PC5 reference point.
  type: string
ParameterOverPc5Rm:
  description: >
    Represents the same as the ParameterOverPc5 data type but with the nullable:true property.
  type: string
  nullable: true
ParameterOverUu:
  description: >
    Represents configuration parameters for V2X communications over Uu reference point.
  type: string
ParameterOverUuRm:
  description: >
    Represents the same as the ParameterOverUu data type but with the nullable:true property.
  type: string
  nullable: true
ParamForProSeDd:
  description: Represents the service parameters for 5G ProSe direct discovery.
  type: string

```

```

ParamForProSeDdRm:
  description: >
    This data type is defined in the same way as the ParamForProSeDd data type,
    but with the OpenAPI nullable property set to true.
  type: string
  nullable: true
ParamForProSeDc:
  description: Represents the service parameters for 5G ProSe direct communications.
  type: string
ParamForProSeDcRm:
  description: >
    This data type is defined in the same way as the ParamForProSeDc data type,
    but with the OpenAPI nullable property set to true.
  type: string
  nullable: true
ParamForProSeU2NRelUe:
  description: Represents the service parameters for 5G ProSe UE-to-network relay UE.
  type: string
ParamForProSeU2NRelUeRm:
  description: >
    This data type is defined in the same way as the ParamForProSeU2NRelay data type,
    but with the OpenAPI nullable property set to true.
  type: string
  nullable: true
ParamForProSeRemUe:
  description: Represents the service parameters for 5G ProSe Remate UE.
  type: string
ParamForProSeRemUeRm:
  description: >
    This data type is defined in the same way as the ParamForProSeRemUe data type,
    but with the OpenAPI nullable property set to true.
  type: string
  nullable: true
UrspRuleRequest:
  description: Contains parameters that can be used to guide the URSP.
  type: object
  properties:
    trafficDesc:
      $ref: '#/components/schemas/TrafficDescriptorComponents'
    routeSelParamSets:
      type: array
      items:
        $ref: '#/components/schemas/RouteSelectionParameterSet'
      minItems: 1
      description: Sets of parameters that may be used to guide the Route Selection Descriptors
of the URSP.
RouteSelectionParameterSet:
  description: >
    Contains parameters that can be used to guide the Route Selection
    Descriptors of the URSP.
  type: object
  properties:
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    precedence:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
    spatialValidity:
      type: array
      items:
        type: string
      minItems: 1
      description: >
        Indicates where the route selection parameters apply. It may correspond
        to a geographical area, for example using a geographic zone identifier that
        is known to the AF and is configured by the operator to correspond to a list
        of or TAIs.
    spatialValidityTAIs:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Tai'
      minItems: 1
      description: Indicates the TAIs in which the route selection parameters apply. This
      attribute is applicable only within the 5GC and it shall not be included in the request messages of
      untrusted AFs for URSP guidance.
  Event:
    anyOf:

```

```

- type: string
  enum:
    - SUCCESS_UE_POL_DEL_SP
    - UNSUCCESS_UE_POL_DEL_SP
- type: string
  description: >
    This string identifies AF subscribe to event(s) notifications related to
    AF provisioned service parameters.
  description: |
    Possible values are:
    - SUCCESS_UE_POL_DEL_SP: Successful UE Policy Delivery related to the invocation of AF
    provisioned Service Parameters.
    - UNSUCCESS_UE_POL_DEL_SP: Unsuccessful UE Policy Delivery related to the invocation of AF
    provisioned Service Parameters.
  AfNotification:
    description: >
      Notifications upon AF Service Parameter Authorization Update e.g. to
      revoke the authorization, and/or AF subscribed event notification of the
      outcome related to the invocation of service parameter provisioning.
    type: object
    properties:
      subscription:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
      reportEvent:
        $ref: '#/components/schemas/Event'
      authResult:
        $ref: '#/components/schemas/AuthorizationResult'
      gpsi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      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".
      dnn:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
      snssai:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
      eventInfo:
        $ref: '#/components/schemas/EventInfo'
    required:
      - subscription
    oneOf:
      - required: [gpsi]
      - required: [externalGroupId]
      - required: [anyUeInd]
    anyOf:
      - required: [reportEvent]
      - required: [authResult]
  TrafficDescriptorComponents:
    description: Traffic descriptor components for the requested URSP.
    type: object
    properties:
      appDescs:
        type: object
        additionalProperties:
          $ref: 'TS29522_5GLANParameterProvision.yaml#/components/schemas/AppDescriptor'
        minProperties: 1
        description: Describes the operation systems and the corresponding applications for each
        operation systems. The key of map is osId.
      flowDescs:
        type: array
        items:
          type: string
        minItems: 1
        description: Represents a 3-tuple with protocol, server ip and server port for UL/DL
        application traffic. The content of the string has the same encoding as the IPFilterRule AVP value
        as defined in IETF RFC 6733.
      domainDescs:
        type: array
        items:
          type: string
        minItems: 1
        description: FQDN(s) or a regular expression which are used as a domain name matching
        criteria.
      ethFlowDescs:

```



```

    type: array
    items:
      $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'
    minItems: 1
    description: Descriptor(s) for destination information of non-IP traffic in which only
ethernet flow description is defined.
  dnns:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    minItems: 1
    description: This is matched against the DNN information provided by the application.
  connCaps:
    type: array
    items:
      $ref: '#/components/schemas/ConnectionCapabilities'
    minItems: 1
    description: This is matched against the information provided by a UE application when it
requests a network connection with certain capabilities.
  anyOf:
    - required: [appDescs]
    - required: [flowDescs]
    - required: [domainDescs]
    - required: [ethFlowDescs]
    - required: [dnns]
    - required: [connCaps]
AuthorizationResult:
  anyOf:
    - type: string
      enum:
        - AUTH_REVOKED
    - type: string
      description: >
        This string indicates NEF notify the AF about the service parameters authorization
        updates result.
      description: |
        Possible values are:
        - AUTH_REVOKED: Indicated the service parameters authorization is revoked.
EventInfo:
  description: Indicates the event information.
  type: object
  properties:
    failureCause:
      $ref: '#/components/schemas/Failure'
Failure:
  oneOf:
    - type: string
      enum:
        - UNSPECIFIED
        - UE_NOT_REACHABLE
        - UNKNOWN
    - type: string
      description: >
        This string represents the failure reason for the unsuccessful result. May be
        present if the reported afSubEvent attribute is "UNSUCCESS_UE_POL_DEL_SP".
      description: |
        Possible values are:
        - UNSPECIFIED: Indicates the PCF received the UE sent UE policy delivery service cause #111
(Protocol error, unspecified).
        - UE_NOT_REACHABLE: Indicates the PCF received the notification from the AMF that the UE is
not reachable.
        - UNKNOWN: Indicates unknown reasons upon no response from the UE, e.g. UPDS message type is
not defined or not implemented by the UE, or not compatible with the UPDS state, in which the UE
shall ignore the UPDS message.
ConnectionCapabilities:
  anyOf:
    - type: string
      enum:
        - IMS
        - MMS
        - SUPL
        - Internet
    - 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

- IMS: Indicates the connection capability to support IMS service.
- MMS: Indicates the connection capability to support MMS service.
- SUPL: Indicates the connection capability to support SUPL service.
- Internet: Indicates the connection capability to support Internet service.

A.10 ACSParameterProvision API

```

openapi: 3.0.0
info:
  title: 3gpp-acs-pp
  version: 1.1.0-alpha.2
  description: |
    API for 5G ACS Parameter Provision.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}/3gpp-acs-pp/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      tags:
        - ACS Configuration Subscriptions
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      responses:
        '200':
          description: OK (Successful get all of the active subscriptions for the AF)
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/AcsConfigurationData'
                minItems: 0
        '307':
          $ref: '#/components/responses/307'
        '308':
          $ref: '#/components/responses/308'
        '400':
          $ref: '#/components/responses/400'
        '401':
          $ref: '#/components/responses/401'
        '403':
          $ref: '#/components/responses/403'
        '404':
          $ref: '#/components/responses/404'
        '406':
          $ref: '#/components/responses/406'
        '429':
          $ref: '#/components/responses/429'
        '500':
          $ref: '#/components/responses/500'
        '503':
          $ref: '#/components/responses/503'
      default:
        $ref: '#/components/responses/default'

```

```

post:
  summary: Creates a new subscription resource
  tags:
    - ACS Configuration Subscriptions
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
  requestBody:
    description: new subscription creation
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AcsConfigurationData'
  responses:
    '201':
      description: Created (Successful creation)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AcsConfigurationData'
      headers:
        Location:
          description: Contains the URI of the newly created resource.
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/subscriptions/{subscriptionId}:
  get:
    summary: read an active subscription for the AF and the subscription Id
    tags:
      - Individual ACS Configuration Subscription
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: subscriptionId
        in: path
        description: Identifier of the subscription resource
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK (Successful get the active subscription)
        content:
          application/json:

```

```

    schema:
      $ref: '#/components/schemas/AcsConfigurationData'
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
  summary: Updates/replaces an existing subscription resource
  tags:
    - Individual ACS Configuration Subscription
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  requestBody:
    description: Parameters to update/replace the existing subscription
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AcsConfigurationData'
  responses:
    '200':
      description: OK (Successful update of the existing subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AcsConfigurationData'
    '204':
      description: >
        Successful case. The resource has been successfully updated and no additional
        content is to be sent in the response message.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'

```

```

    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

patch:
  summary: Modifies 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 modify the existing subscription.
    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/AcsConfigurationDataPatch'
  responses:
    '200':
      description: OK. The subscription resource was successfully modified and a representation
of the updated resource is returned.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AcsConfigurationData'
    '204':
      description: No Content. The resource has been successfully modified and no additional
content is to be sent in the response message.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing subscription
  tags:
    - Individual ACS Configuration Subscription
  parameters:
    - name: afId
      in: path

```

```

    description: Identifier of the AF
    required: true
    schema:
      type: string
  - name: subscriptionId
    in: path
    description: Identifier of the subscription resource
    required: true
    schema:
      type: string
responses:
  '204':
    description: No Content (Successful deletion of the existing subscription)
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    AcsConfigurationData:
      description: Represents an individual ACS Configuration subscription resource.
      type: object
      properties:
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        exterGroupId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        acsInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AcsInfo'
        mtcProviderId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - acsInfo
        - suppFeat
    AcsConfigurationDataPatch:
      description: Represents the parameters to request to modify an existing Individual ACS
      Configuration subscription resource.
      type: object
      properties:
        acsInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AcsInfo'
        mtcProviderId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'

```

A.11 MoLcsNotify API

openapi: 3.0.0
info:

```

title: 3gpp-mo-lcs-notify
version: 1.1.0-alpha.1
description: |
  API for UE updated location information notification.
  © 2021, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.
externalDocs:
  description: 3GPP TS 29.522 V17.2.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}/3gpp-mo-lcs-notify/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /:
    post:
      summary: UE location information update notification
      tags:
        - AF level UE location update notification operation
      requestBody:
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LocUpdateData'
            required: true
      responses:
        '200':
          description: Success
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/LocUpdateDataReply'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    LocUpdateData:
      description: Represents a UE updated location information.
      type: object
      properties:
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'

```

```

locInfo:
  $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
lcsQosClass:
  $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/LcsQosClass'
svcId:
  $ref: 'TS29515_Ngmlc_Location.yaml#/components/schemas/ServiceIdentity'
suppFeat:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
required:
- gpsi
- lcsQosClass
- locInfo
- suppFeat
LocUpdateDataReply:
description: Represents a reply to a MO LCS notification.
type: object
properties:
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
required:
- suppFeat

```

A.12 AKMA API

```

openapi: 3.0.0
info:
  title: 3gpp-akma
  version: 1.0.0-alpha.5
  description: |
    API for AKMA.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
- {}
- oAuth2ClientCredentials: []
servers:
- url: '{apiRoot}/3gpp-akma/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /retrieve:
    post:
      summary: Retrieve AKMA Application Key Information.
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AkmaAfKeyRequest'
      responses:
        '200':
          description: The requested information was returned successfully.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/AkmaAfKeyData'
        '204':
          description: No Content.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':

```



```

    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

```

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    AkmaAfKeyRequest:
      description: >
        Represents the parameters to request the retrieval of AKMA Application Key information.
      type: object
      properties:
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
        afId:
          $ref: '#/components/schemas/AfId'
        aKId:
          $ref: '#/components/schemas/AKId'
      required:
        - afId
        - aKId
    AkmaAfKeyData:
      description: Represents AKMA Application Key information data.
      type: object
      properties:
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        expiry:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
        kaf:
          type: string
        supi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
      required:
        - kaf
        - expiry
    AfId:
      description: Represents an AF identifier.
      type: string
    AKId:
      description: Represents an AKMA Key Identifier.
      type: string

```

A.13 TimeSyncExposure API

```

openapi: 3.0.0
info:
  title: 3gpp-time-sync-exposure
  version: 1.0.0-alpha.4
  description: |
    API for time synchronization exposure.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  externalDocs:
    description: >
      3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.

```

```

url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
- {}
- oAuth2ClientCredentials: []
servers:
- url: '{apiRoot}/3gpp-time-sync/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      tags:
      - Time Synchronization Exposure 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/TimeSyncExposureSubsc'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    post:
      summary: Creates a new subscription resource
      tags:
      - Time Synchronization Exposure Subscriptions
      parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      requestBody:
        description: new subscription creation
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/TimeSyncExposureSubsc'
      responses:
        '201':
          description: Created (Successful creation)
          content:

```

```

    application/json:
      schema:
        $ref: '#/components/schemas/TimeSyncExposureSubsc'
  headers:
    Location:
      description: 'Contains the URI of the newly created resource'
      required: true
      schema:
        type: string
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  callbacks:
    timeSyncSubsNotification:
      '{$request.body#/subsNotifUri}':
        post:
          requestBody:
            description: Notification for Time Synchronization Capability for a list of UEs.
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/TimeSyncExposureSubsNotif'
          responses:
            '204':
              description: Expected response to a successful callback processing without a body
            '307':
              $ref: 'TS29122_CommonData.yaml#/components/responses/307'
            '308':
              $ref: 'TS29122_CommonData.yaml#/components/responses/308'
            '400':
              $ref: 'TS29122_CommonData.yaml#/components/responses/400'
            '401':
              $ref: 'TS29122_CommonData.yaml#/components/responses/401'
            '403':
              $ref: 'TS29122_CommonData.yaml#/components/responses/403'
            '404':
              $ref: 'TS29122_CommonData.yaml#/components/responses/404'
            '411':
              $ref: 'TS29122_CommonData.yaml#/components/responses/411'
            '413':
              $ref: 'TS29122_CommonData.yaml#/components/responses/413'
            '415':
              $ref: 'TS29122_CommonData.yaml#/components/responses/415'
            '429':
              $ref: 'TS29122_CommonData.yaml#/components/responses/429'
            '500':
              $ref: 'TS29122_CommonData.yaml#/components/responses/500'
            '503':
              $ref: 'TS29122_CommonData.yaml#/components/responses/503'
            default:
              $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  /{afId}/subscriptions/{subscriptionId}:
    get:
      summary: read an active subscription for the AF and the subscription Id
      tags:
        - Individual Time Synchronization 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:
  '200':
    description: OK (Successful get the active subscription)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/TimeSyncExposureSubsc'
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing subscription
  tags:
    - Individual Time Synchronization Exposure Subscription
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: subscriptionId
      in: path
      description: Identifier of the subscription resource
      required: true
      schema:
        type: string
  responses:
    '204':
      description: No Content (Successful deletion of the existing subscription)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':

```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/subscriptions/{subscriptionId}/configurations:
  get:
    summary: read all of the active configurations for the AF
    tags:
      - Time Synchronization Exposure Configurations
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: subscriptionId
        description: String identifying the individual synchronization Exposure Subscription
        resource in the NEF
        in: path
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK (Successful get all of the active configurations for the AF)
        content:
          application/json:
            schema:
              type: array
              items:
                $ref: '#/components/schemas/TimeSyncExposureConfig'
              minItems: 0
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  post:
    summary: Creates a new configuration resource
    tags:
      - Time Synchronization Exposure Configurations
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: subscriptionId
        description: >
          String identifying the individual synchronization Exposure Subscription
          resource in the NEF.
        in: path
        required: true
        schema:
          type: string
    requestBody:

```

```

description: new configuration creation
required: true
content:
  application/json:
    schema:
      $ref: '#/components/schemas/TimeSyncExposureConfig'
responses:
  '201':
    description: Created (Successful creation)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/TimeSyncExposureConfig'
    headers:
      Location:
        description: 'Contains the URI of the newly created resource'
        required: true
        schema:
          type: string
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
callbacks:
  timeSyncConfigNotification:
    '{$request.body#/configNotifUri}':
      post:
        requestBody:
          description: Notification for Time Synchronization Service status.
          required: true
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/TimeSyncExposureConfigNotif'
        responses:
          '204':
            description: Expected response to a successful callback processing without a body
          '307':
            $ref: 'TS29122_CommonData.yaml#/components/responses/307'
          '308':
            $ref: 'TS29122_CommonData.yaml#/components/responses/308'
          '400':
            $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          '401':
            $ref: 'TS29122_CommonData.yaml#/components/responses/401'
          '403':
            $ref: 'TS29122_CommonData.yaml#/components/responses/403'
          '404':
            $ref: 'TS29122_CommonData.yaml#/components/responses/404'
          '411':
            $ref: 'TS29122_CommonData.yaml#/components/responses/411'
          '413':
            $ref: 'TS29122_CommonData.yaml#/components/responses/413'
          '415':
            $ref: 'TS29122_CommonData.yaml#/components/responses/415'
          '429':
            $ref: 'TS29122_CommonData.yaml#/components/responses/429'
          '500':
            $ref: 'TS29122_CommonData.yaml#/components/responses/500'
          '503':

```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/subscriptions/{subscriptionId}/configurations/{instanceReference}:
  get:
    summary: read an active subscription for the AF and the subscription ID
    tags:
      - Individual Time Synchronization 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: instanceReference
        in: path
        description: Identifier of the configuration resource
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK (Successful get the active subscription)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/TimeSyncExposureConfig'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  put:
    summary: Updates/replaces an existing configuration resource
    tags:
      - Individual Time Synchronization Exposure Configuration
    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: instanceReference
        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/TimeSyncExposureConfig'
  responses:
    '200':
      description: OK (Successful deletion of the existing configuration)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/TimeSyncExposureConfig'
    '204':
      description: >
        Successful case. The resource has been successfully updated and no additional
        content is to be sent in the response message.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing configuration
  tags:
    - Individual Time Synchronization Exposure Configuration
  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: instanceReference
      in: path
      description: Identifier of the configuration resource
      required: true
      schema:
        type: string
  responses:
    '204':
      description: No Content (Successful deletion of the existing configuration)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'

```



```

'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

```
/{afId}/asti-configurations:
```

```
get:
```

```
summary: read all of the active configuration of 5G access stratum time distribution for the
```

AF

```
tags:
```

```
- ASTI Configurations
```

```
parameters:
```

```
- name: afId
```

```
in: path
```

```
description: Identifier of the AF
```

```
required: true
```

```
schema:
```

```
type: string
```

```
responses:
```

```
'200':
```

```
description: OK (Successful get all of the active configurations for the AF)
```

```
content:
```

```
application/json:
```

```
schema:
```

```
type: array
```

```
items:
```

```
$ref: '#/components/schemas/AccessTimeDistributionData'
```

```
minItems: 0
```

```
'307':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/307'
```

```
'308':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/308'
```

```
'400':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/400'
```

```
'401':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/401'
```

```
'403':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/403'
```

```
'404':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/404'
```

```
'406':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/406'
```

```
'429':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/429'
```

```
'500':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/500'
```

```
'503':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/503'
```

```
default:
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/default'
```

```
post:
```

```
summary: Creates a new configuration resource
```

```
tags:
```

```
- ASTI 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/AccessTimeDistributionData'
  responses:
    '201':
      description: Created (Successful creation)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AccessTimeDistributionData'
      headers:
        Location:
          description: 'Contains the URI of the newly created resource'
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/asti-configurations/retrieve:
  post:
    summary: "Request the status of the 5G access stratum time distribution for a list of UEs."
    tags:
      - ASTI Configurations Retrieve (Document)
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
    requestBody:
      description: Contains the information for the status of the 5G access stratum time
distribution
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/StatusRequestData'
    responses:
      '200':
        description: Successful retrieval of the status of the 5G access stratum time distribution
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/StatusResponseData'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29571_CommonData.yaml#/components/responses/413'

```

```

'415':
  $ref: 'TS29571_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29571_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29571_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29571_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29571_CommonData.yaml#/components/responses/default'

/{afId}/asti-configurations/{astiConfigId}:
get:
  summary: read an active configuration for the AF and the configuration Id
  tags:
    - Individual ASTI Configuration
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: astiConfigId
      in: path
      description: Identifier of the configuration resource
      required: true
      schema:
        type: string
  responses:
    '200':
      description: OK (Successful get the active configuration)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AccessTimeDistributionData'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29122_CommonData.yaml#/components/responses/406'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing configuration
  tags:
    - Individual ASTI Configuration
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: astiConfigId
      in: path
      description: Identifier of the configuration resource
      required: true
      schema:
        type: string
  responses:

```

```

'204':
  description: No Content (Successful deletion of the existing configuration)
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

```

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    TimeSyncExposureSubsc:
      description: >
        Contains requested parameters for the subscription to the notification
        of time synchronization capability.
      type: object
      properties:
        exterGroupId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        gpsis:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
          minItems: 1
          description: >
            Contains a list of UE for which the time synchronization capabilities is requested.
        anyUeInd:
          type: boolean
          description: >
            Any UE indication. This IE shall be present if the event subscription
            is applicable to any UE. Default value "false" is used, if not present.
        afServiceId:
          type: string
          description: Identifies a service on behalf of which the AF is issuing the request.
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        snssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        subsNotifId:
          type: string
          description: Notification Correlation ID assigned by the NF service consumer.
        subsNotifUri:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        subscribedEvents:
          type: array
          items:
            $ref: '#/components/schemas/SubscribedEvent'
          minItems: 1
          description: Subscribed events
        eventFilters:
          type: array
          items:
            $ref: '#/components/schemas/EventFilter'
          minItems: 1
          description: >
            Contains the filter conditions to match for notifying the event(s)

```

```

    of time synchronization capabilities for a list of UE(s).
  notifMethod:
    $ref: 'TS29508_Nsmf_EventExposure.yaml#/components/schemas/NotificationMethod'
  maxReportNbr:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  expiry:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
  repPeriod:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
  requestTestNotification:
    type: boolean
    description: >
      Set to true by the SCS/AS to request the SCEF to send a test notification
      as defined in subclause 5.2.5.3 of 3GPP TS 29.122. Set to false or omitted otherwise.
  websocketNotifConfig:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsocketNotifConfig'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - subsNotifUri
    - subsNotifId
TimeSyncCapability:
  description: Contains time synchronization capability.
  type: object
  properties:
    upNodeId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
    gmCapables:
      type: array
      items:
        $ref: '#/components/schemas/GmCapable'
    asTimeRes:
      $ref: '#/components/schemas/AsTimeResource'
    ptpCapForUes:
      type: object
      additionalProperties:
        $ref: '#/components/schemas/PtpCapabilitiesPerUe'
      minProperties: 1
      description: >
        Contains the PTP capabilities supported by each of the UE(s).
        The key of the map is the gpsi.
  required:
    - upNodeId
  anyOf:
    - required: [gmCapables]
    - required: [asTimeRes]
TimeSyncExposureConfig:
  description: Contains the Time Synchronization Configuration parameters.
  type: object
  properties:
    upNodeId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint64'
    reqPtpIns:
      $ref: '#/components/schemas/PtpInstance'
    gmEnable:
      type: boolean
      description: >
        Indicates that the AF requests 5GS to act as a grandmaster for PTP
        or gPTP if it is included and set to true.
    gmPrio:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    timeDom:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    uuErrorBudget:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    configNotifId:
      type: string
      description: Notification Correlation ID assigned by the NF service consumer.
    configNotifUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    tempValidity:
      $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/TemporalValidity'
  required:
    - upNodeId
    - reqPtpIns
    - timeDom
    - configNotifId

```

```

- configNotifUri

TimeSyncExposureSubsNotif:
description: Contains the notification of time synchronization capability.
type: object
properties:
  subsNotifId:
    type: string
    description: Notification Correlation ID assigned by the NF service consumer.
  eventNotifs:
    type: array
    items:
      $ref: '#/components/schemas/SubsEventNotification'
    minItems: 1
required:
- subsNotifId
- eventNotifs

SubsEventNotification:
description: Notifications about subscribed Individual Events.
type: object
properties:
  event:
    $ref: '#/components/schemas/SubscribedEvent'
  timeSyncCapas:
    type: array
    items:
      $ref: '#/components/schemas/TimeSyncCapability'
    minItems: 1
required:
- event

TimeSyncExposureConfigNotif:
description: Contains the notification of time synchronization service state.
type: object
properties:
  configNotifId:
    type: string
    description: Notification Correlation ID assigned by the NF service consumer.
  stateOfConfig:
    $ref: '#/components/schemas/StateOfConfiguration'
required:
- configNotifId
- stateOfConfig

PtpCapabilitiesPerUe:
description: Contains the supported PTP capabilities per UE.
type: object
properties:
  gpsi:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  ptpCaps:
    type: array
    items:
      $ref: '#/components/schemas/EventFilter'
    minItems: 1
required:
- gpsi
- ptpCaps

EventFilter:
description: >
  Contains the filter conditions to match for notifying the event(s) of time
  synchronization capabilities.
type: object
properties:
  instanceTypes:
    type: array
    items:
      $ref: '#/components/schemas/InstanceType'
    minItems: 1
  transProtocols:
    type: array
    items:
      $ref: '#/components/schemas/Protocol'
    minItems: 1
  ptpProfiles:
    type: array
    items:
      type: string

```

```

    minItems: 1
  PtpInstance:
    description: Contains PTP instance configuration and activation requested by the AF.
    type: object
    properties:
      instanceType:
        $ref: '#/components/schemas/InstanceType'
      protocol:
        $ref: '#/components/schemas/Protocol'
      ptpProfile:
        type: string
      portConfigs:
        type: array
        items:
          $ref: '#/components/schemas/ConfigForPort'
        minItems: 1
    required:
      - instanceType
      - protocol
      - ptpProfile

  ConfigForPort:
    description: Contains configuration for each port.
    type: object
    properties:
      gpsi:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      n6Ind:
        type: boolean
      ptpEnable:
        type: boolean
      logSyncInter:
        type: integer
      logSyncInterInd:
        type: boolean
      logAnnouInter:
        type: integer
      logAnnouInterInd:
        type: boolean

  StateOfConfiguration:
    description: Contains the state of the time synchronization configuration.
    type: object
    properties:
      state:
        type: boolean
        description: When it is set to true, it indicates the states of configurations for NW-TT
port and all DS-TT port are active. When it is set to false, it indicates the state of
configurations for NW-TT port or at least one of the DS-TT port are inactive
      inactiveNwtt:
        type: boolean
        description: When it is included and set to true, it indicates the state of configuration
for NW-TT port is inactive. It may be included when the "state" attribute is set to false. Default
value is false.
      inactiveDstts:
        description: Contains the UE identities. The states of configurations for DS-TT ports
corresponding to these UEs are inactive. It may be included when the "state" attribute is set to
false.
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        minItems: 1
    required:
      - state

  Protocol:
    anyOf:
      - type: string
        enum:
          - ETH
          - IPV4
          - IPV6
      - type: string
        description: >
          This string identifies supported protocol.
    description: |
      Possible values are:
      - ETH: Indicates Ethernet as defined in IEEE Std 1588 [45] Annex E is supported.

```

- IPV4: Indicates IPv4 as defined in IEEE Std 1588 [45] Annex C is supported.
- IPV6: Indicates IPv6 as defined in IEEE Std 1588 [45] Annex D is supported.

```

AccessTimeDistributionData:
  description: Contains the parameters for the creation of 5G access stratum time distribution
  configuration..
  type: object
  properties:
    gpsis:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      minItems: 1
    exterGroupId:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
    anyUeInd:
      type: boolean
      description: Identifies whether the request applies to any UE. This attribute shall set to
"true" if applicable for any UE, otherwise, set to "false".
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    asTimeDisParam:
      $ref:
'TS29565_Ntsctsf_TimeSynchronization.yaml#/components/schemas/AsTimeDistributionParam'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - asTimeDisParam
  oneOf:
    - required: [gpsis]
    - required: [interGrpId]
    - required: [anyUeInd]
StatusRequestData:
  description: Contains the parameters for retrieval of the status of the access stratum time
  distribution for a list of UEs.
  type: object
  properties:
    gpsis:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      minItems: 1
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
  required:
    - gpsis
StatusResponseData:
  description: Contains the parameters for the status of the access stratum time distribution
  for a list of UEs.
  type: object
  properties:
    inactiveUes:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      minItems: 1
    activeUes:
      type: array
      items:
        $ref: '#/components/schemas/ActiveUe'
      minItems: 1
ActiveUe:
  description: Contains the UE identifier whose status of the access stratum time distribution
  is active and the optional requested time synchronization error budget.
  type: object
  properties:
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    timeSyncErrBdgt:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
GmCapable:
  anyOf:
    - type: string
    enum:

```



```

    - GPTP
    - PTP
  - type: string
    description: >
      This string identifies supported grandmaster.
  description: |
    Possible values are:
    - GPTP: gPTP grandmaster is supported.
    - PTP: PTP grandmaste is supported.
InstanceType:
  anyOf:
  - type: string
    enum:
    - BOUNDARY_CLOCK
    - E2E_TRANS_CLOCK
    - P2P_TRANS_CLOCK
    - P2P_RELAY_INSTANCE
  - type: string
    description: >
      This string identifies supported PTP instance type.
  description: |
    Possible values are:
    - BOUNDARY_CLOCK: Indicates Boundary Clock as defined in IEEE Std 1588.
    - E2E_TRANS_CLOCK: Indicates End-to-End Transparent Clock as defined in IEEE Std 1588.
    - P2P_TRANS_CLOCK: Indicates Peer-to-Peer Transparent Clock as defined in IEEE Std 1588.
    - P2P_RELAY_INSTANCE: Indicates PTP Relay instance as defined in IEEE Std 802.1AS.

SubscribedEvent:
  anyOf:
  - type: string
    enum:
    - AVAILABILITY_FOR_TIME_SYNC_SERVICE
  - type: string
    description: >
      This string identifies supported event.
  description: |
    Possible values are:
    - AVAILABILITY_FOR_TIME_SYNC_SERVICE: The UE is availability for time synchronization
service.

AsTimeResource:
  anyOf:
  - type: string
    enum:
    - ATOMIC_CLOCK
    - GNSS
    - TERRESTRIAL_RADIO
    - SERIAL_TIME_CODE
    - PTP
    - NTP
    - HAND_SET
    - INTERNAL_OSCILLATOR
    - OTHER
  - type: string
    description: >
      This string identifies the supported 5G clock quality.
  description: |
    Possible values are:
    - ATOMIC_CLOCK: Indicates atomic clock is supported.
    - GNSS: Indicates Global Navigation Satellite System is supported.
    - TERRESTRIAL_RADIO: Indicates terrestrial radio is supported.
    - SERIAL_TIME_CODE: Indicates serial time code is supported.
    - PTP: Indicates PTP is supported.
    - NTP: Indicates NTP is supported.
    - HAND_SET: Indicates hand set is supported.
    - INTERNAL_OSCILLATOR: Indicates internal oscillator is supported.
    - OTHER: Indicates other source of time is supported.

```

A.14 EcsAddressProvision API

```

openapi: 3.0.0
info:
  title: 3gpp-ecs-address-provision
  version: 1.0.0-alpha.4
  description: |

```

API for ECS Address Provisioning.

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All rights reserved.

```
externalDocs:
  description: >
    3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
- {}
- oAuth2ClientCredentials: []
servers:
- url: '{apiRoot}/3gpp-ecs-address-provision/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/configurations:
    get:
      summary: read all active configurations for a given AF
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      responses:
        '200':
          description: OK (Successful get all of the active resources for the AF)
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/EcsAddressProvision'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    post:
      summary: Creates a new configuration resource
      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/EcsAddressProvision'
      responses:
        '201':
```

```

description: Created (Successful creation)
content:
  application/json:
    schema:
      $ref: '#/components/schemas/EcsAddressProvision'
headers:
  Location:
    description: 'Contains the URI of the newly created resource'
    required: true
    schema:
      type: string
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

```
/{afId}/configurations/{configurationId}:
```

```
get:
```

```
summary: read an active resource for the AF and the configuration Id
```

```
parameters:
```

- name: afId
 in: path
 description: Identifier of the AF
 required: true
 schema:
 type: string
- name: configurationId
 in: path
 description: Identifier of the configuration resource
 required: true
 schema:
 type: string

```
responses:
```

```

'200':
  description: OK (Successful get the active resource)
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/EcsAddressProvision'
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'406':
  $ref: 'TS29122_CommonData.yaml#/components/responses/406'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:

```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
  summary: Updates/replaces an existing resource
  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 resource
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/EcsAddressProvision'
  responses:
    '200':
      description: OK (Successful update of the existing resource)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/EcsAddressProvision'
    '204':
      description: >
        Successful case. The resource has been successfully updated and no additional
        content is sent in the response message.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing configuration resource
  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 resource)
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
  schemas:
    EcsAddressProvision:
      description: Represents ECS address provision configuration.
      type: object
      properties:
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        ecsServerAddr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/EcsServerAddr'
        spatialValidityCond:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SpatialValidityCond'
        tgtUe:
          $ref: 'TS29522_AnalyticsExposure.yaml#/components/schemas/TargetUeId'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - ecsServerAddr
        - suppFeat

```

A.15 AMPolicyAuthorization API

```

openapi: 3.0.0
info:
  title: 3gpp-am-policyauthorization
  version: 1.0.0-alpha.4
  description: |
    API for AM policy authorization.
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    All rights reserved.
  externalDocs:
    description: >
      3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
    url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
  security:
    - {}
    - oAuth2ClientCredentials: []
  servers:
    - url: '{apiRoot}/3gpp-am-policyauthorization/v1'
      variables:
        apiRoot:
          default: https://example.com
          description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
  paths:
    /{afId}/app-am-contexts:
      post:

```

```

summary: Creates a new Individual application AM Context resource
operationId: PostAppAmContexts
tags:
  - Application AM Contexts
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/AppAmContextExpData'
responses:
  '201':
    description: Created (Successful creation)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AppAmContextExpRespData'
    headers:
      Location:
        description: Contains the URI of the newly created resource.
        required: true
        schema:
          type: string
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
callbacks:
  amEventNotification:
    '{$request.body#/evSubsc/eventNotifUri}':
      post:
        requestBody:
          description: Notification of an event occurrence.
          required: true
          content:
            application/json:
              schema:
                $ref:
'TS29534_Npcf_AMPolicyAuthorization.yaml#/components/schemas/AmEventsNotification'
      responses:
        '204':
          description: The receipt of the notification is acknowledged
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'

```

```

    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/app-am-contexts/{appAmContextId}:
  get:
    summary: read an existing Individual application AM context
    operationId: GetAppAmContext
    tags:
      - Individual Application AM Context
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: appAmContextId
        in: path
        description: Identifier of the Individual application AM context
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK (A representation of the resource is successfully returned)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppAmContextExpData'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  patch:
    summary: partial modifies an existing Individual application AM context
    operationId: ModAppAmContext
    tags:
      - Individual Application AM Context
    parameters:
      - name: afId
        in: path

```

```

    description: Identifier of the AF
    required: true
    schema:
      type: string
  - name: appAmContextId
    in: path
    description: Identifier of the application AM context resource
    required: true
    schema:
      type: string
requestBody:
  required: true
  content:
    application/merge-patch+json:
      schema:
        $ref: '#/components/schemas/AppAmContextExpUpdateData'
responses:
  '200':
    description: >
      successful modification of the resource and a representation of that
      resource is returned. If a subscribed event is matched, the event
      notification is also included in the response.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AppAmContextExpRespData'
  '204':
    description: The successful modification
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
callbacks:
  amEventNotification:
    '{$request.body#/evSubsc/eventNotifUri}':
      post:
        requestBody:
          description: Notification of an event occurrence.
          required: true
          content:
            application/json:
              schema:
                $ref:
' TS29534_Npcf_AMPolicyAuthorization.yaml#/components/schemas/AmEventsNotification'
responses:
  '204':
    description: The receipt of the notification is acknowledged
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':

```



```

    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

delete:

```

summary: Deletes an existing Individual Application AM Context
operationId: DeleteAppAmContext
tags:
  - Individual Application AM Context
parameters:
  - name: afId
    in: path
    description: Identifier of the AF
    required: true
    schema:
      type: string
  - name: appAmContextId
    in: path
    description: string identifying the Individual application AM context resource
    required: true
    schema:
      type: string
responses:
  '204':
    description: The deletion is confirmed without returning additional data.
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

/{afId}/app-am-contexts/{appAmContextId}/events-subscription:

```

put:
summary: creates or modifies an AM Policy Events Subscription sub-resource.
operationId: UpdateAmEventsSubsc
tags:
  - AM Policy Events Subscription
parameters:
  - name: afId
    in: path
    description: Identifier of the AF
    required: true
    schema:

```

```

    type: string
  - name: appAmContextId
    in: path
    description: string identifying the AM Policy Events Subscription subresource
    required: true
    schema:
      type: string
  requestBody:
    description: >
      Creation or modification of an application AM Policy Events Subscription sub-resource.
    required: true
    content:
      application/json:
        schema:
          $ref: 'TS29534_Npcf_AMPolicyAuthorization.yaml#/components/schemas/AmEventsSubscData'
  responses:
    '201':
      description: >
        The creation of the application AM Policy Events Subscription sub-resource
        is confirmed and its representation is returned. If an AM Event is matched,
        the response also includes the notification.
      content:
        application/json:
          schema:
            $ref:
'TS29534_Npcf_AMPolicyAuthorization.yaml#/components/schemas/AmEventsSubscRespData'
      headers:
        Location:
          description: >
            Contains the URI of the created AM Policy Events Subscription
            subresource, according to the structure
            {apiRoot}/3gpp-am-policyauthorization/v1/{afId}/app-am-
            contexts/{appAmContextId}/events-subscription
          required: true
          schema:
            type: string
    '200':
      description: >
        The modification of the AM Policy Events Subscription subresource is confirmed
        and its representation is returned. If an AM Event is matched, the response also
        includes the notification.
      content:
        application/json:
          schema:
            $ref:
'TS29534_Npcf_AMPolicyAuthorization.yaml#/components/schemas/AmEventsSubscRespData'
    '204':
      description: >
        The modification of the AM Policy Events Subscription subresource is confirmed
        without returning additional data.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  callbacks:
    amEventNotification:

```



```

    '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:
    AppAmContextExpData:
      description: Represents an Individual application AM context exposure resource.
      type: object
      properties:
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        evSubscs:
          type: array
          items:
            $ref: 'TS29534_Npcf_AMPolicyAuthorization.yaml#/components/schemas/AmEventsSubscData'
          minItems: 1
        gpsi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
        afAppIds:
          type: array
          items:
            type: string
          minItems: 1
          description: Identifies an application.
        highThruInd:
          type: boolean
        covReqs:
          type: array
          items:
            $ref: '#/components/schemas/GeographicalArea'
          minItems: 1
        policyDuration:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
        trafficFilters:
          type: array
          items:
            $ref: 'TS29122_CommonData.yaml#/components/schemas/FlowInfo'
          minItems: 1
        ethTrafficFilters:
          type: array
          items:
            $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'
          minItems: 1
        notificationDestination:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        requestTestNotification:
          type: boolean
          description: >
            Set to true by the AF to request the NEF to send a test notification
            as defined in subclause 5.2.5.3 of 3GPP TS 29.122. Set to false or omitted otherwise.
        websocketNotifConfig:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsocketNotifConfig'
      required:
        - gpsi
      anyOf:
        - required: [highThruInd]
        - required: [covReqs]
      oneOf:
        - required: [afAppIds]
        - required: [trafficFilters]
        - required: [ethTrafficFilters]

    AppAmContextExpUpdateData:
      description: >
        Contains the modification(s) to be applied to the Individual application
        AM context exposure resource.
      type: object
      properties:
        evSubscs:

```

```

    type: array
    items:
      $ref: 'TS29534_Npcf_AMPolicyAuthorization.yaml#/components/schemas/AmEventsSubscDataRm'
    minItems: 1
  afAppIds:
    type: array
    items:
      type: string
    minItems: 1
    description: Identifies an application.
  highThruInd:
    type: boolean
  covReqs:
    type: array
    items:
      $ref: '#/components/schemas/GeographicalArea'
    minItems: 1
  policyDuration:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
  trafficFilters:
    type: array
    items:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/FlowInfo'
    minItems: 1
  ethTrafficFilters:
    type: array
    items:
      $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/EthFlowDescription'
    minItems: 1
  notificationDestination:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'

GeographicalArea:
  description: Contains geographical area information (e.g.a civic address or shapes).
  type: object
  properties:
    civicAddress:
      $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/CivicAddress'
    shapes:
      $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicArea'

AppAmContextExpRespData:
  description: >
    It represents a response to a modification or creation request of an Individual
    Application AM resource. It may contain the notification of the already met events
  anyOf:
    - $ref: 'TS29534_Npcf_AMPolicyAuthorization.yaml#/components/schemas/AppAmContextData'
    - $ref: 'TS29534_Npcf_AMPolicyAuthorization.yaml#/components/schemas/AmEventsNotification'

```

A.16 AMInfluence API

```

openapi: 3.0.0
info:
  title: AMInfluence
  version: 1.0.0-alpha.2
  description: |
    AMInfluence API Service.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/
servers:
  - url: '{apiRoot}/3gpp-am-influence/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501
security:
  - {}
  - oAuth2ClientCredentials: []
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:
    - AM Influence Subscription
  responses:
    '200':
      description: OK (Successful get all of the active subscriptions for the AF).
      content:
        application/json:
          schema:
            type: array
            items:
              $ref: '#/components/schemas/AmInfluSub'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29122_CommonData.yaml#/components/responses/406'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  post:
    summary: Create a new subscription to AM influence.
    operationId: CreateAMInfluenceSubscription
    tags:
      - AM Influence Subscription
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AmInfluSub'
    responses:
      '201':
        description: Create a new Individual AM Influence Subscription resource.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AmInfluSub'
        headers:
          Location:
            description: >
              Contains the URI of the newly created resource, according to the structure
              {apiRoot}/3gpp-am-influence/v1/{afId}/subscriptions/{subscriptionId}.
            required: true
            schema:
              type: string
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':

```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
callbacks:
  notificationDestination:
    '{$request.body#/notificationDestination}':
      post:
        requestBody:
          required: true
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/AmInfluEventNotif'
                minItems: 1
      responses:
        '204':
          description: No Content, Notification was succesfull
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
/{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 subscription identified by the subscriptionId.
    tags:
      - Individual AM Influence Subscription
    responses:
      '200':
        description: OK (Successful get the active subscription)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AmInfluSub'

```

```

'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'406':
  $ref: 'TS29122_CommonData.yaml#/components/responses/406'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
put:
  summary: Update/Replace an existing subscription resource.
  tags:
    - Individual AM Influence Subscription
  requestBody:
    description: Parameters to update/replace the existing subscription.
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AmInfluSub'
  responses:
    '200':
      description: OK (Successful update of the subscription)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AmInfluSub'
    '204':
      description: No Content
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
patch:
  summary: Update/Replace an existing subscription resource.
  tags:
    - Individual AM Influence Subscription
  requestBody:
    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/AmInfluSubPatch'

```



```

responses:
  '200':
    description: OK. The subscription was modified successfully.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/AmInfluSub'
  '204':
    description: No Content
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
delete:
  summary: Delete an existing subscription.
  tags:
    - Individual AM Influence Subscription
  responses:
    '204':
      description: No Content (Successful deletion of the existing subscription)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes: {}
  schemas:
    AmInfluSub:
      description: Represents an AM influence subscription.
      type: object
      properties:
        afTransId:
          type: string
        supi:

```

```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
  gpsi:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  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".
  dnnSnssaiInfos:
    type: array
    items:
      $ref: '#/components/schemas/DnnSnssaiInformation'
    minItems: 1
    description: Each of the element identifies a (DNN, S-NSSAI) combination.
  afAppIds:
    type: array
    items:
      type: string
    minItems: 1
    description: Each of the element identifies an application.
  highThruInd:
    type: boolean
  geoAreas:
    type: array
    items:
      $ref: 'TS29522_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'
    minItems: 1
    description: Identifies geographic areas of the user where the request is applicable.
  policyDuration:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
  self:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
  subscribedEvents:
    type: array
    items:
      $ref: '#/components/schemas/AmInfluEvent'
    minItems: 1
    description: Indicates one or more AM influence related events.
  notificationDestination:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
  requestTestNotification:
    type: boolean
    description: >
      Set to true by the AF to request the NEF to send a test notification
      as defined in subclause 5.2.5.3 of 3GPP TS 29.122. Set to false or omitted otherwise.
  websocketNotifConfig:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsocketNotifConfig'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - afTransId
  anyOf:
    - required: [highThruInd]
    - required: [geoAreas]
  oneOf:
    - required: [gpsi]
    - required: [externalGroupId]
    - required: [anyUeInd]
AmInfluSubPatch:
  description: >
    Represents parameters to request the modification of an AM influence subscription resource.
  type: object
  properties:
    highThruInd:
      type: boolean
    geoAreas:
      type: array
      items:
        $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicArea'
      minItems: 1
      description: Identifies geographic areas of the user where the request is applicable.
    policyDuration:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSecRm'
    dnnSnssaiInfos:
      type: array
      items:

```

```

    $ref: '#/components/schemas/DnnSnssaiInformation'
  minItems: 1
  description: Each of the element identifies a (DNN, S-NSSAI) combination.
afAppIds:
  type: array
  items:
    type: string
  minItems: 1
  description: Each of the element identifies an application.
subscribedEvents:
  type: array
  items:
    $ref: '#/components/schemas/AmInfluEvent'
  minItems: 1
  description: Indicates one or more AM influence related events.
notificationDestination:
  $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
afTransId:
  type: string
  description: Identifies an NEF Northbound interface transaction, generated by the AF.
AmInfluEventNotif:
  description: Represents an AM influence event notification.
  type: object
  properties:
    afTransId:
      type: string
    event:
      $ref: '#/components/schemas/AmInfluEvent'
    geoAreas:
      type: array
      items:
        $ref: 'TS29522_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'
      minItems: 1
      description: Identifies geographic areas of the user where the request is applicable.
  required:
    - event
    - afTransId
DnnSnssaiInformation:
  description: Represents a (DNN, SNSSAI) combination.
  type: object
  properties:
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'

# ENUMERATIONS DATA TYPES
#
AmInfluEvent:
  description: Represents the service area coverage outcome event.
  anyOf:
    - type: string
      enum:
        - SERVICE_AREA_COVRG_OUTCOME
    - type: string

```

A.17 MBSTMGI API

```

openapi: 3.0.0
info:
  title: 3gpp-mbs-tmgi
  version: 1.0.0-alpha.2
  description: |
    API for the allocation, deallocation and management of TMGI(s) for MBS.
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    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

security:
  - {}
  - oAuth2ClientCredentials: []

```

```

servers:
  - url: '{apiRoot}/3gpp-mbs-tmgi/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.

paths:
  /allocate:
    post:
      summary: Request the allocation of TMGI(s) for new MBS session(s) or the refresh of the expiry
time of already allocated TMGI(s).
      operationId: AllocateTmgi
      tags:
        - TMGI Allocation or Timer Expiry Refresh
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/TmgiAllocRequest'
      responses:
        '200':
          description: >
            Successful case. The allocated TMGI(s) or a refreshed expiry time for
            the concerned already allocated TMGI(s) is/are returned to the requesting AF.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/TmgiAllocResponse'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      callbacks:
        TmgiTimerExpiryNotification:
          '{$request.body#/notificationUri}':
            post:
              requestBody:
                description: >
                  Represents the TMGI(s) timer expiry notification information
                  (e.g. list of TMGI(s) for which the timer has expired).
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/ExpiryNotif'
              responses:
                '204':
                  description: Expected response to a successful callback processing without a body
                '307':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
                '400':

```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

/deallocate:

```

  post:
    summary: Request the deallocation of TMGI(s).
    operationId: DeallocateTmgi
    tags:
      - TMGI Deallocation
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/TmgiDeallocRequest'
    responses:
      '204':
        description: No Content. Successful case, the TMGI(s) have been deallocated
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

components:

```

  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

```

schemas:

```

  TmgiAllocRequest:
    description: >
      Represents the full set of parameters to initiate a TMGI(s) allocation
      request or the refresh of the expiry time of already allocated TMGI(s).

```

```

type: object
properties:
  afId:
    type: string
  tmgiParams:
    $ref: 'TS29532_Nmbsmf_TMGI.yaml#/components/schemas/TmgiAllocate'
  notificationUri:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
  requestTestNotification:
    type: boolean
  websocketNotifConfig:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsocketNotifConfig'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
required:
- afId
- tmgiParams

TmgiAllocResponse:
description: >
  Represents TMGI(s) allocation information or the refreshed expiry time
  for already allocated TMGI(s)
type: object
properties:
  tmgiInfo:
    $ref: 'TS29532_Nmbsmf_TMGI.yaml#/components/schemas/TmgiAllocated'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
required:
- tmgiInfo

TmgiDeallocRequest:
description: Represents information to request the deallocation of TMGI(s).
type: object
properties:
  afId:
    type: string
  tmgis:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Tmgi'
    minItems: 1
required:
- afId
- tmgis

ExpiryNotif:
description: Represents TMGI(s) timer expiry notification information.
type: object
properties:
  tmgis:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Tmgi'
    minItems: 1
required:
- tmgis

```

A.18 MBSSession API

openapi: 3.0.0

info:

```

title: 3gpp-mbs-session
version: 1.0.0-alpha.2
description: |
  API for MBS Session management.
  © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.

```

externalDocs:

```

description: >
  3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

```

servers:

```

- url: '{apiRoot}/3gpp-mbs-session/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501

security:
- {}
- oAuth2ClientCredentials: []

paths:
/mbs-sessions:
  post:
    summary: Create
    tags:
      - MBS sessions collection
    operationId: Create
    requestBody:
      description: representation of the MBS session to be created in the NEF
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MbsSessionCreateReq'
    responses:
      '201':
        description: successful creation of an MBS session
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MbsSessionCreateRsp'
        headers:
          Location:
            description: >
              Contains the URI of the newly created resource, according to the structure
              {apiRoot}/3gpp-mbs-session/v1/mbsessions/{mbsSessionId}
            required: true
            schema:
              type: string
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/mbs-sessions/{mbsSessionId}:
  parameters:
    - name: mbsSessionId
      in: path
      description: Identifier of the MBS Session
      required: true
      schema:
        type: string

  patch:
    summary: Request the Modification of an existing Individual MBS Session resource.
    tags:

```

```

- Individual MBS Session
requestBody:
  required: true
  content:
    application/json-patch+json:
      schema:
        type: array
        items:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PatchItem'
        minItems: 1
responses:
  '204':
    description: No Content. The Individual MBS Session resource was successfully modified.
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing MBS Session resource
  tags:
    - Individual MBS Session
  responses:
    '204':
      description: No Content (Successful deletion of the existing MBS Session resource)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/mbs-sessions/subscriptions:
  get:
    summary: read all of the active MBS Sessions status subscriptions
    tags:
      - MBS Session Subscriptions
    responses:
      '200':
        description: OK.
        content:

```



```

    application/json:
      schema:
        type: array
        items:
          $ref: '#/components/schemas/MbsSessionSubsc'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29122_CommonData.yaml#/components/responses/406'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

post:
  summary: Creates a new MBS Session subscription resource
  tags:
    - MBS Session subscriptions
  requestBody:
    description: Request to create a new MBS Session subscription resource
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MbsSessionSubsc'
  callbacks:
    notificationUri:
      '{request.body#/notificationUri}':
        post:
          requestBody: # contents of the callback message
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/MbsSessionStatusNotif'
  responses:
    '204':
      description: No Content (successful notification)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

```

responses:
  '201':
    description: Created (Successful creation of subscription)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MbsSessionSubsc'
    headers:
      Location:
        description: Contains the URI of the newly created resource.
        required: true
        schema:
          type: string
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/mbs-sessions/subscriptions/{subscriptionId}:
  parameters:
    - name: subscriptionId
      in: path
      description: Identifier of the MBS Session subscription resource
      required: true
      schema:
        type: string
  get:
    summary: read an active MBS Session subscriptions for the SCS/AS and the subscription Id
    tags:
      - Individual MBS Session subscription
    responses:
      '200':
        description: OK (Successful get the active subscription)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MbsSessionSubsc'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

```

delete:
  summary: Deletes an already existing subscription
  tags:
    - Individual MBS Session Subscription
  responses:
    '204':
      description: No Content (Successful deletion of the existing subscription)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

  schemas:
    #
    # STRUCTURED DATA TYPES
    #
    MbsSessionCreateReq:
      description: Data within Create Request
      type: object
      properties:
        afId:
          type: string
        mbsSession:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSession'
      required:
        - mbsSession
    MbsSessionCreateRsp:
      description: Data within Create Response
      type: object
      properties:
        mbsSession:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSession'
      required:
        - mbsSession
    MbsSessionSubsc:
      description: Represents an MBS Session Subscription.
      type: object
      properties:
        afId:
          type: string
        subscription:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSessionSubscription'
      required:
        - subscription
    MbsSessionStatusNotif:
      description: Represents an MBS Session Status notification.
      type: object
      properties:
        eventList:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSessionEventReportList'

```

```
#
# SIMPLE DATA TYPES
#
#
# ENUMERATIONS
#
```

A.19 EASDeployment API

```
openapi: 3.0.0
info:
  title: 3gpp-eas-deployment
  version: 1.0.0-alpha.1
  description: |
    API for AF provisioned EAS Deployment.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.5.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
- {}
- OAuth2ClientCredentials: []
servers:
- url: '{apiRoot}/3gpp-eas-deployment/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/eas-deployment-info:
    get:
      summary: read all EAS Deployment information for a given AF
      parameters:
        - name: afId
          in: path
          description: Identifier of the AF
          required: true
          schema:
            type: string
      responses:
        '200':
          description: OK (Successful get all of the EAS Deployment information for the AF)
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/EasDeployInfo'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '406':
          $ref: 'TS29122_CommonData.yaml#/components/responses/406'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'
```

```

post:
  summary: Create a new Individual EAS Deployment information resource.
  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/EasDeployInfo'
  responses:
    '201':
      description: Created (Successful creation)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/EasDeployInfo'
      headers:
        Location:
          description: 'Contains the URI of the newly created resource'
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/{afId}/eas-deployment-info/{easDeployInfoId}:
  get:
    summary: read an active Individual EAS Deployment Information resource for the AF
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: easDeployInfoId
        in: path
        description: Identifier of an EAS Deployment Information.
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK (Successful get the active resource)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/EasDeployInfo'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':

```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

put:

summary: Updates/replaces an existing resource

parameters:

- name: afId
 - in: path
 - description: Identifier of the AF
 - required: true
 - schema:
 - type: string
- name: easDeployInfoId
 - in: path
 - description: Identifier of the EAS Deployment information resource
 - required: true
 - schema:
 - type: string

requestBody:

description: Parameters to update/replace the existing resource

required: true

content:

```

  application/json:
    schema:
      $ref: '#/components/schemas/EasDeployInfo'

```

responses:

```

  '200':
    description: OK (Successful update of the existing resource)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/EasDeployInfo'
  '204':

```

description: Successful case. The resource has been successfully updated and no additional content is sent in the response message.

```

  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

```

delete:
  summary: Deletes an already existing EAS Deployment information resource
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: easDeployInfoId
      in: path
      description: Identifier of the EAS Deployment information resource
      required: true
      schema:
        type: string
  responses:
    '204':
      description: No Content (Successful deletion of the existing resource)
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  components:
    securitySchemes:
      oAuth2ClientCredentials:
        type: oauth2
        flows:
          clientCredentials:
            tokenUrl: '{tokenUrl}'
            scopes: {}
  schemas:
    EasDeployInfo:
      description: Represents EAS Deployment Information.
      type: object
      properties:
        self:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
        afServiceId:
          type: string
        fqdns:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Fqdn'
          minItems: 1
        appId:
          type: string
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        snssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        externalGroupId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        dnaiInfos:
          type: object
          additionalProperties:
            $ref: '#/components/schemas/DnaiInformation'
          minProperties: 1
          description: list of DNS server identifier (consisting of IP address and port) and/or IP
            address(s) of the EAS in the local DN for each DNAI. The key of map is the DNAI.
          required:
            - fqdns

```

```
DnaiInformation:
  description: Represents DNAI information.
  type: object
  properties:
    dnai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    dnsServIds:
      type: array
      items:
        $ref: '#/components/schemas/DnsServerIdentifier'
      minItems: 1
    easIpAdrs:
      type: array
      items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
      minItems: 1
  required:
    - dnai
  anyOf:
    - required: [dnsServIds]
    - required: [easIpAdrs]
DnsServerIdentifier:
  description: Represents DNS server identifier (consisting of IP address and port).
  type: object
  properties:
    dnsServIpAddr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
    portNumber:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  required:
    - dnsServIpAddr
    - portNumber
```


Annex B (informative): Change history

Change history							
Date	Meeting	TDoc.	CR	Rev	Cat	Subject/Comment	New
2018-03	CT3#95					TS Skeleton	0.0.0
2018-03	CT3#95					Inclusion of C3-181332 and TS skeleton of Network Exposure Function Northbound APIs in C3-181362.	0.1.0
2018-04	CT3#96					Inclusion of C3-182407, C3-182408, C3-182504, C3-182418, C3-182505, C3-182443, C3-182421, C3-182422, C3-182501 and editorial changes from Rapporteur.	0.2.0
2018-05	CT3#97					Inclusion of C3-183187, C3-183773, C3-183774, C3-183553, C3-183826, C3-183329, C3-183776, C3-183827, C3-183778, C3-183605 and editorial changes from Rapporteur.	0.3.0
2018-06	CT#80					TS sent to plenary for approval	1.0.0
2018-06	CT#80					TS approved by plenary	15.0.0
2018-09	CT#81	CP-182015	0001	1	F	DNAI change notification type	15.1.0
2018-09	CT#81	CP-182015	0002		F	Corrections on NEF Northbound interface	15.1.0
2018-09	CT#81	CP-182015	0003	1	F	TrafficInfluence API OpenAPI schema	15.1.0
2018-09	CT#81	CP-182015	0004	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 procedures and API	15.1.0
2018-09	CT#81	CP-182031	0006	1	F	Definition of setting up an AS session with required QoS procedure and API	15.1.0
2018-09	CT#81	CP-182015	0007	2	F	Resource structure update	15.1.0
2018-09	CT#81	CP-182015	0008		F	Procedures for monitoring – Reference	15.1.0
2018-09	CT#81	CP-182015	0009		F	Ethernet packet filter for AF traffic influence API	15.1.0
2018-09	CT#81	CP-182015	0010	3	F	Removable attribute definition for AF traffic influence	15.1.0
2018-09	CT#81	CP-182015	0011		F	Supported feature for AF traffic influence	15.1.0
2018-09	CT#81	CP-182015	0012		F	Version numbering change	15.1.0
2018-09	CT#81	CP-182015	0013		F	Removal of externaldocs field	15.1.0
2018-09	CT#81	CP-182035	0014	1	F	PFD Management Service Operation	15.1.0
2018-12	CT#82	CP-183205	0015	2	F	ExternalDocs field	15.2.0
2018-12	CT#82	CP-183205	0019		F	Default value for apiRoot	15.2.0
2018-12	CT#82	CP-183205	0021	4	F	Correct traffic route and Ethernet flow data type	15.2.0
2018-12	CT#82	CP-183205	0022	1	F	Event correction for AF influence traffic routing	15.2.0
2018-12	CT#82	CP-183205	0024	1	F	Supporting Ethernet UE in Chargeable Party and AF session with QoS	15.2.0
2018-12	CT#82	CP-183205	0025	1	F	Add AF application ID for traffic influence	15.2.0
2018-12	CT#82	CP-183205	0026	1	F	Add BSF interaction for Chargeable Party and Required QoS	15.2.0
2018-12	CT#82	CP-183205	0028	2	F	Security field	15.2.0
2018-12	CT#82	CP-183205	0029	1	F	Corrections on subscribed event	15.2.0
2018-12	CT#82	CP-183205	0030	1	F	Status code update for TrafficInfluence API	15.2.0
2018-12	CT#82	CP-183205	0031	3	F	UE information during notification	15.2.0
2018-12	CT#82	CP-183205	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	B	Support of external group Id	16.0.0
2019-06	CT#84	CP-191070	0043	2	B	Nnef_MSISDN-less_MO_SMS service	16.0.0
2019-06	CT#84	CP-191070	0044	2	B	Application function notification of downlink data delivery status	16.0.0
2019-06	CT#84	CP-191070	0045	2	B	Availability after DDN failure notification for multiple Afs	16.0.0
2019-06	CT#84	CP-191070	0050	2	B	Network parameter provisioning support	16.0.0
2019-06	CT#84	CP-191070	0051	3	B	NIDD configuration and delivery in 5G	16.0.0
2019-06	CT#84	CP-191229	0054	5	B	AF acknowledgement of UP path event notification	16.0.0
2019-06	CT#84	CP-191071	0055	2	B	UE IP address preservation indication	16.0.0
2019-06	CT#84	CP-191104	0056	1	B	PFD management notification	16.0.0
2019-06	CT#84	CP-191100	0057	1	B	NEF stored exposure data	16.0.0

2019-06	CT#84	CP-191105	0058	1	B	BDT Warning Notification Support	16.0.0
2019-06	CT#84	CP-191101	0061	1	F	API version update	16.0.0
2019-09	CT#85	CP-192137	0063	1	F	Resolving EN in NIDD	16.1.0
2019-09	CT#85	CP-192156	0064	1	B	Support a set of MAC addresses in traffic filter	16.1.0
2019-09	CT#85	CP-192165	0066	1	B	Support parameter provisioning in RACS	16.1.0
2019-09	CT#85	CP-192157	0067	2	B	Accurate UE moving trajectory definition	16.1.0
2019-09	CT#85	CP-192157	0069	2	B	Procedures for Nnef_AnalyticsExposure Service	16.1.0
2019-09	CT#85	CP-192157	0070	2	B	API definition for Nnef_AnalyticsExposure Service	16.1.0
2019-09	CT#85	CP-192170	0071	1	B	Procedures for 5G LAN type service over northbound interface	16.1.0
2019-09	CT#85	CP-192170	0072	2	B	API definition for 5G LAN type service over northbound interface	16.1.0
2019-09	CT#85	CP-192169	0073	2	B	PFD management partial failure	16.1.0
2019-09	CT#85	CP-192157	0074	1	B	Cancel the BDT warning notification	16.1.0
2019-09	CT#85	CP-192219	0075	2	B	Notification of downlink data delivery status	16.1.0
2019-09	CT#85	CP-192179	0076	2	B	Applying BDT policy	16.1.0
2019-09	CT#85	CP-192152	0077	2	B	API definition for Nnef_IPTVconfiguration service	16.1.0
2019-09	CT#85	CP-192137	0079		B	Nnef_ECRestriction service	16.1.0
2019-09	CT#85	CP-192137	0080		B	Differences between EPC and 5GC	16.1.0
2019-09	CT#85	CP-192158	0081	1	F	Service consumer description Corrections	16.1.0
2019-09	CT#85	CP-192138	0082	2	B	AF acknowledgement of UP path event notification	16.1.0
2019-09	CT#85	CP-192138	0083		B	Successful AF acknowledgement without N6 traffic routing information	16.1.0
2019-09	CT#85	CP-192173	0084		F	OpenAPI version update for TS 29.522 Rel-16	16.1.0
2019-09	CT#85	CP-192251	0085	1	B	Procedures for Nnef_IPTVconfiguration service	16.1.0
2019-12	CT#86	CP-193179	0086	1	B	Nnef_APISupportCapability Service	16.2.0
2019-12	CT#86	CP-193181	0087		B	OpenAPI file update to support AF acknowledgement	16.2.0
2019-12	CT#86	CP-193179	0088	1	B	Scheduled communication type	16.2.0
2019-12	CT#86	CP-193181	0089	1	F	Open issue for AddrPreservation feature	16.2.0
2019-12	CT#86	CP-193222	0090	1	B	Partial update for 5GLANParameterProvision API	16.2.0
2019-12	CT#86	CP-193222	0091	2	B	OpenAPI file for 5GLANParameterProvision API	16.2.0
2019-12	CT#86	CP-193191	0092	3	F	Clarify multicast access control	16.2.0
2019-12	CT#86	CP-193222	0093	1	F	Clarify the procedure for 5GLAN parameter provisioning	16.2.0
2019-12	CT#86	CP-193223	0094		F	Correct resource URI for xBDT	16.2.0
2019-12	CT#86	CP-193220	0096	3	B	PFD partial failure notification	16.2.0
2019-12	CT#86	CP-193223	0097	1	F	Correction to HTTP methods used to update BDT policy	16.2.0
2019-12	CT#86	CP-193191	0099	1	F	Partial update of IPTVConfiguration API	16.2.0
2019-12	CT#86	CP-193191	0100	2	B	OpenAPI file of IPTVConfiguration API	16.2.0
2019-12	CT#86	CP-193198	0101	3	B	AnalyticsEventNotif and AnalyticsExposureSubsc Data types	16.2.0
2019-12	CT#86	CP-193198	0102		B	Open issue for AnalyticsEvent data type	16.2.0
2019-12	CT#86	CP-193198	0103	1	B	Partial update of Nnef_AnalyticsExposure API	16.2.0
2019-12	CT#86	CP-193198	0104	2	B	Nnef_AnalyticsExposure_fetch service operation	16.2.0
2019-12	CT#86	CP-193181	0105		F	Correct the condition for AF relocation acknowledgement	16.2.0
2019-12	CT#86	CP-193199	0106		B	URI structure for N33 APIs	16.2.0
2019-12	CT#86	CP-193198	0107		B	OpenAPI file for AnalyticsExposure API	16.2.0
2019-12	CT#86	CP-193222	0108	1	D	Corrections on 5GLANParameterProvision API	16.2.0
2019-12	CT#86	CP-193181	0109		F	Definition of AfResultInfo in OpenAPI	16.2.0
2019-12	CT#86	CP-193212	0110	1	F	Update of API version and TS version in OpenAPI file	16.2.0
2019-12	CT#86	CP-193188	0112	1	A	make the storage of traffic influence request in the UDR mandatory	16.2.0
2019-12	CT#86	CP-193223	0113	1	F	missing required in ApplyingBdtPolicy API file	16.2.0
2019-12	CT#86	CP-193188	0115		A	Correct cardinality in traffic influence	16.2.0
2019-12	CT#86	CP-193198	0116	1	F	Feature name correction for BDT notification	16.2.0
2020-03	CT#87e	CP-200207	0118		B	DNN Clarification	16.3.0
2020-03	CT#87e	CP-200198	0119	1	B	Update of the Availability after DDN Failure event	16.3.0
2020-03	CT#87e	CP-200198	0120	1	B	Update of the DDD status event	16.3.0
2020-03	CT#87e	CP-200212	0122	1	B	Procedure of Nnef_ServiceParameter service	16.3.0
2020-03	CT#87e	CP-200212	0123	1	B	Resources and data types of Nnef_ServiceParameter service	16.3.0
2020-03	CT#87e	CP-200266	0124	3	B	OpenAPI file of Nnef_ServiceParameter service	16.3.0
2020-03	CT#87e	CP-200202	0125	1	B	QoS Monitoring Report	16.3.0
2020-03	CT#87e	CP-200218	0126	1	B	Indication of traffic correlation	16.3.0
2020-03	CT#87e	CP-200203	0127	1	B	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		B	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	B	Support network performance analytics	16.3.0
2020-03	CT#87e	CP-200208	0132	1	B	Support BDT policy candidates in notification	16.3.0
2020-03	CT#87e	CP-200212	0133	1	B	Add alternative QoS requirements	16.3.0
2020-03	CT#87e	CP-200142	0134	2	B	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 "bdtReflid" 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	B	UE Location Privacy Setting in NEF	16.3.0
2020-03	CT#87e	CP-200237	0142	2	B	AnalyticsExposure API, Analytics Event Filter associated with all events	16.3.0
2020-03	CT#87e	CP-200208	0143	1	B	AnalyticsExposure API, support of abnormal behaviour	16.3.0
2020-03	CT#87e	CP-200208	0144	1	B	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	CT#88e	CP-201243	0148	1	F	Missing mapping in the overview	16.4.0
2020-06	CT#88e	CP-201238	0149	2	F	Wrong datatypes Datatime and Plmn	16.4.0
2020-06	CT#88e	CP-201234	0150	1	F	Wrong datatype referred in analytics exposure procedure	16.4.0
2020-06	CT#88e	CP-201228	0151	1	B	Procedure of ACS Information Configuration	16.4.0
2020-06	CT#88e	CP-201228	0152	1	B	Resources and data types of Nnef_ACSPParameterProvision service	16.4.0
2020-06	CT#88e	CP-201339	0153	4	B	OpenAPI file of Nnef_ACSPParameterProvision service	16.4.0
2020-06	CT#88e	CP-201235	0159	1	F	Loss of connectivity reason	16.4.0
2020-06	CT#88e	CP-201235	0161	1	F	Any UE clarification	16.4.0
2020-06	CT#88e	CP-201252	0162	1	F	Correction to 5GLANParameterProvision API	16.4.0
2020-06	CT#88e	CP-201228	0163	1	F	Correction to IPTVConfiguration API	16.4.0
2020-06	CT#88e	CP-201253	0164	1	F	Correction to ApplyingBdtPolicy API	16.4.0
2020-06	CT#88e	CP-201252	0165	1	F	Open issue for 5GLanParametersProvisionPatch	16.4.0
2020-06	CT#88e	CP-201195	0167	6	B	Supporting the Location Services in NEF in TS 29.522	16.4.0
2020-06	CT#88e	CP-201235	0169	1	F	Periodic reporting by Nnef	16.4.0
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History

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