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Foreword

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

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

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- x the first digit:
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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

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)".
- [38] 3GPP TS 29.535: "5G System; AKMA Anchor Services; Stage 3".
- [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".
- [55] 3GPP TS 23.003: "Numbering, addressing and identification".
- [56] 3GPP TS 33.558: "Security aspects of enhancement of support for enabling edge applications; Stage 2".
- [57] 3GPP TS 29.510: "Network Function Repository Services; Stage 3".
- [58] 3GPP TS 29.517: "5G System; Application Function (AF) event exposure service".
- [59] 3GPP TS 26.531: "Data Collection and Reporting; General Description and Architecture".
- [60] 3GPP TS 26.532: "Data Collection and Reporting; Protocols and Formats".
- [61] 3GPP TS 29.564: "5G System; User Plane Function Services; Stage 3".
- [62] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".
- [63] 3GPP TS 29.537: "Multicast/Broadcast Policy Control Services; Stage 3".
- [64] 3GPP TS 29.214: "Policy and Charging Control over Rx reference point".
- [65] 3GPP TS 26.502: "5G multicast–broadcast services; User Service architecture".
- [66] 3GPP TS 29.580: "Multicast/Broadcast Service Function Services; Stage 3".
- [67] 3GPP TS 26.512: "5G Media Streaming (5GMS); Protocols".

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 |
| ASTI | Access Stratum TIme distribution |
| 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], 3GPP TS 23.247 [53] for MBS specific aspects and 3GPP TS 26.531 [59] for data reporting provisioning and Media Streaming Event Exposure 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 management and parameters provisioning.
- 25) Procedures for Data Reporting.
- 26) Procedures for Data Reporting Provisioning.
- 27) Procedures for AF specific UE ID retrieval.
- 28) Procedures for Media Streaming Event Exposure.
- 29) Procedures for MBS User Service management.
- 30) Procedures for MBS User Data Ingest Session management.

Which correspond to the following services respectively, supported by the NEF as defined in 3GPP TS 23.502 [2] or 3GPP TS 26.531 [59]:

- 1) Nnef_EventExposure service and Nnef_APISupportCapability service
- 2) Nnef_Trigger service
- 3) Nnef_BDTPNegotiation service
- 4) Nnef_ParameterProvision service
- 5) Nnef_PFDManagement service
- 6) Nnef_TrafficInfluence service
- 7) Nnef_ChargeableParty service
- 8) Nnef_AFsessionWithQoS service

- 9) Nnef_MSISDN-less_MO_SMS service
- 10) Nnef_NIDDConfiguration and Nnef_NIDD services
- 11) Nnef_AnalyticsExposure service
- 12) Nnef_ApplyPolicy service
- 13) Nnef_ECRestriction service
- 14) Nnef_IPTVConfiguration service
- 15) Nnef_ServiceParameter service
- 16) Nnef_UCMFProvisioning service
- 17) Nnef_Location service
- 18) Nnef_AKMA service
- 19) Nnef_AMInfluence
- 20) Nnef_AMPolicyAuthorization service
- 21) Nnef_TimeSynchronization and Nnef_ASTI services
- 22) Nnef_EASDeployment service
- 23) Nnef_MBSTMGI service
- 24) Nnef_MBSSession service
- 25) Nnef_DataReporting
- 26) Nnef_DataReportingProvisioning
- 27) Nnef_UEId service
- 28) Nnef_MSEventExposure service
- 29) Nnef_MBSUserService
- 30) Nnef_MBSUserDataIngestSession

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".

NOTE 5: The Nnef_MSEventExposure service maps to the Nnef_EventExposure service and is applicable for the case where the event consumer AF in the Application Service Provider is deployed outside the trusted domain, as described in 3GPP TS 26.531 [59], and the subscribed event is set to "MS_QOE_METRICS", "MS_CONSUMPTION", "MS_NET_ASSIST_INVOCATION", "MS_DYN_POLICY_INVOCATION", or "MS_ACCESS_ACTIVITY".

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.

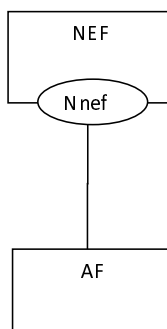


Figure 4.2-1: Reference Architecture for the Nnef Service; SBI representation

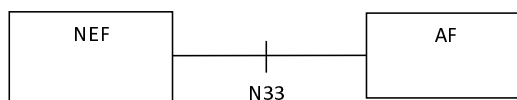


Figure 4.2-2: Reference Architecture for the Nnef Service; reference point representation

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.
- The NEF may provide means for an untrusted event consumer AF to perform Media Streaming Event Exposure monitoring.

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 clauses.

4.4.2 Procedures for Monitoring

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

- description of the SCS/AS applies to the AF;
- description of the SCEF applies to the NEF;
- description of the HSS applies to the UDM, and the NEF shall interact with the UDM by using Nudm_EventExposure service as defined in 3GPP TS 29.503 [17];
- description of the MME/SGSN applies to the AMF, the NEF shall resolve a location area to the involved AMF(s) either by local configuration or via the NRF, and the NEF shall interact with the AMF by using Namf_EventExposure service as defined in 3GPP TS 29.518 [18];
- description about the PCRF is not applicable;
- description about the change of IMSI-IMEI(SV) association monitoring event applies to the change of SUPI-PEI association monitoring event;
- when "monitoringType" sets to "LOCATION_REPORTING" within the MonitoringEventSubscription data type as defined in clause 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 clause 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" feature as defined in clause 5.3.4 of 3GPP TS 29.122 [4] is supported, values 0-5 are not applicable for the lossOfConnectReason attribute within MonitoringEventReport data type, the lossOfConnectReason attribute shall be set to 6 if the UE is deregistered, 7 if the maximum detection timer expires or 8 if the UE is purged;
- the AF may include a periodic reporting time indicated by the "repPeriod" attribute within MonitoringEventSubscription data type, which is only applicable for the "Location_notification" 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 clause 5.3.4 of 3GPP TS 29.122 [4] is supported, the "dnn" and/or "snssai" 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" feature as defined in clause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support the downlink data delivery status notification;
 - 1) the AF shall send an HTTP POST message to the NEF to the resource "Monitoring Event Subscriptions" as defined in clause 5.3.3.2 of 3GPP TS 29.122 [4] for creating a subscription or send an HTTP PUT message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in clause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription with the following difference:
 - A) 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; and
 - B) 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 clause 5.5.2.2 of 3GPP TS 29.503 [17];
 - 2) if the "Partial_group_modification" feature as defined in clause 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; and
 - 3) when the NEF receives the event notification as defined in clause 4.4.2 of 3GPP TS 29.508 [26], the NEF shall send an HTTP POST message to the AF as defined in clause 4.4.2.3 of 3GPP TS 29.122 [4] with the difference that within each MonitoringEventReport data structure, the NEF shall include:
 - A) the downlink data delivery status within the "dddStatus" attribute;
 - B) the downlink data descriptor impacted by the downlink data delivery status change within the "dddTraDescriptor" attribute;
 - C) the estimated buffering time within the "maxWaitTime" attribute if the downlink data delivery status is set to "BUFFERED"; and
 - D) if the "Availability_after_DDN_failure_notification_enhancement" feature as defined in clause 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 clause 5.3.3.2 of 3GPP TS 29.122 [4] for creating a subscription or send an HTTP PUT message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in clause 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 clause 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 clause 5.3.3.2 of 3GPP TS 29.122 [4] for creating a subscription or send an HTTP PUT message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in clause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription with the following difference:
 - 1) 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 clause 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". The "accuracy" attribute and "locQoS" attribute are mutually exclusive. If the "MULTIQOS" feature is also supported, Multiple QoS Class is supported in the "lcsQoSClass" attribute within the "locQoS" attribute for deferred MT-LR;

- 2)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 clause 6.1 of 3GPP TS 29.515 [35];
- 3)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 clause 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 clause 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 clause 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 clause 5.3 of 3GPP TS 29.518 [18]; or may interact with UDM by using Nudm_EventExposure service as defined in clause 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 clause 5.5 of 3GPP TS 29.518 [18]; and
- 4)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 clause 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 clause 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 clause 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;

- Based on local regulations' requirements and operator policies, user consent management specified in Annex V of 3GPP TS 33.501 [6] may be required for EDGE applications to access the Nnef_EventExposure API for UE's location retrieval. When it is the case and the NEF is used by the Edge Enabler Layer entities to access 3GPP 5GC services, the NEF acts as the consent enforcement entity, as specified in clause 5.1.3 of 3GPP TS 33.558 [56];

When user consent management shall be carried out for EDGE applications, then:

- 1)if the AF (e.g. Edge Enabler Server) does not support the "UserConsentRevocation" feature or does not indicate its support for this feature in the HTTP POST request to create a new "Individual Monitoring Event Subscription" resource with the "monitoringType" attribute set to "LOCATION_REPORTING", the NEF shall reject the request and respond to the AF with an HTTP "403 Forbidden" status code with the response body including a ProblemDetails data structure containing the "CONSENT_REVOCATION_NOT_SUPPORTED" application error within the "cause" attribute;
- 2)if the AF indicates its support for the "UserConsentRevocation" feature in the HTTP POST request to create a new "Individual Monitoring Event Subscription" resource with the "monitoringType" attribute set to "LOCATION_REPORTING", the NEF shall check user consent for the targeted UE(s) by retrieving the user consent subscription data via the Nudm_SDM service API of the UDM as specified in clause 5.2.2.2.24 of 3GPP TS 29.503 [17], subscribe to user consent revocation notifications only for those UE(s) for which user consent is granted also using the Nudm_SDM service API of the UDM and accept the request for the creation of the event monitoring subscription only for the UE(s) for which user consent is granted;

- 3) if user consent is not granted for all the targeted UE(s), the NEF shall reject the request and respond to the AF with an HTTP "403 Forbidden" status code with the response body including a ProblemDetails data structure including the "USER_CONSENT_NOT_GRANTED" application error within the "cause" attribute;
- 4) the AF shall provide within the HTTP POST request to create a new event monitoring subscription the URI via which it desires to receive user consent revocation notifications within the "revocationNotifUri" attribute. The AF may update this URI in subsequent HTTP PUT/PATCH requests to update/modify the corresponding "Individual Monitoring Event Subscription" resource;
- 5) when becoming aware of user consent revocation for one or several UE(s), the NEF shall:
 - A) stop processing the data related to the concerned UE(s);
 - B) send a user consent revocation notification to the AF by sending an HTTP POST request with the request body including the ConsentRevocNotif data structure that shall contain the user consent revocation information (e.g. UE(s) for which user consent was revoked, etc.); and
 - C) remove the concerned UE(s) from the corresponding "Individual Monitoring Event Subscription" resource and from the related subscriptions at the GMLC, if any; and
 - D) unsubscribe from user consent revocation notifications for the concerned UE(s) at the UDM;and
- 6) at the reception of the user consent revocation notification from the NEF, the AF shall take the necessary actions to stop processing the data related to the UE(s) for which user consent was revoked;
 - if user consent is revoked for all the UE(s), the AF shall delete the corresponding "Individual Monitoring Event Subscription" resource as specified above in this clause.
 - if the "NSAC" feature defined in clause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support network slice status reporting:
 - 1) the AF shall send an HTTP POST request to the NEF to the "Monitoring Event Subscriptions" resource as defined in clause 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 clause 5.3.3.3.2 of 3GPP TS 29.122 [4] to update an existing subscription with the following differences:
 - A) within the MonitoringEventSubscription data structure:
 - a) either the concerned network slice identified by the "snssai" attribute, in the case of a trusted AF, or the AF service identifier within the "afServiceId" attribute, in the case of an untrusted AF, 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 or one-time 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 shall be 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;
 - 2) 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];

If an AF service identifier was provided by the AF (case of an untrusted AF), the NEF shall translate it into the corresponding S-NSSAI prior to sending the request(s) to the NSACF(s).

After receiving a successful response from the NSACF(s), 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).

A)for the HTTP POST request, respond to the AF as defined in clause 5.3.3.2.3.4 of 3GPP TS 29.122 [4] with either;

a) 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

b) 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"; and

B)for the HTTP PUT request, respond to the AF with a "200 OK" status code as defined in clause 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.

3)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 clause 5.3.3A.2.3 of 3GPP TS 29.122 [4] with the following differences:

A)within the MonitoringEventReport data type of the MonitoringNotification data type;

a)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);

b)the AF service identifier to which the notification is related, within the "afServiceId" attribute, if it was provided by the AF in the related subscription request; and

c)the current network slice status information as the "nSStatusInfo" attribute shall be provided, wherein:

D)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; and

II)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 clause 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).

- 4) 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 clause 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]; and
- if the "UEId_retrieval" feature defined in clause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support AF specific UE ID retrieval:
 - 1) the AF may request AF specific UE ID retrieval for an individual UE, by providing the UE's IP address in the "ueIpAddr" attribute or the UE's MAC address in the "ueMacAddr" attribute within the `MonitoringEventSubscription` data type;
 - 2) the AF may also provide the DNN, within the "dnn" attribute, and/or the S-NSSAI, within the "snssai" attribute, in the `MonitoringEventSubscription` data type;
 - 3) upon reception of the corresponding subscription request message from the AF, the NEF shall check whether the AF is authorized to perform this operation or not:
 - if the AF's request is not authorized, the NEF shall respond to the AF with a "403 Forbidden" status code with the response body including the `ProblemDetails` data structure containing the "cause" attribute set to the "REQUEST_NOT_AUTHORIZED" application error indicating AF authorisation failure; and
 - if the AF request is authorized by the NEF, then if the DNN and/or S-NSSAI information is not available in the request, the NEF shall determine the corresponding DNN and/or S-NSSAI information based on the received requesting AF Identifier, and if provided, the MTC Provider Information;
 - 4) the NEF shall then interact with the BSF using the UE address and IP domain (if the UE IPv4 address is provided), DNN and/or S-NSSAI to retrieve the session binding information of the UE by invoking the `Nbsf_Management_Discovery` service operation as described in 3GPP TS 29.521 [9];
 - 5) if the NEF receives an error response from the BSF, the NEF shall respond to the AF with a proper error status code. If the NEF received from the BSF an error response including a "ProblemDetails" data structure with the "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error. If no SUPI matching the provided UE information is returned by the BSF, the NEF shall respond to the AF with a "404 Not Found" status code with the response body including a `ProblemDetails` data structure containing the "cause" attribute set to the "UE_NOT_FOUND" application error to indicate that the requested UE address is not found;
 - 6) upon success and a SUPI is returned by the BSF, the NEF shall then interact with the UDM to retrieve the AF specific UE Identifier using the received SUPI and at least one of the Application Port ID, MTC Provider Information or AF Identifier information by invoking `Nudm_SDM_Get` service as described in clause 5.2.2.2 of 3GPP TS 29.503 [17];
 - 7) upon success, the UDM responds to the NEF with an AF specific UE Identifier represented as an External Identifier for the UE which is uniquely associated with the MTC provider Information and/or AF Identifier. The NEF shall then respond to the AF with the received information, i.e. the AF specific UE Identifier represented as an External Identifier that was received from the UDM;
 - 8) if the NEF receives an error response from the UDM, the NEF shall respond to the AF with a proper error status code. If the NEF received from the UDM an error response including a "ProblemDetails" data structure with the "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error. If the UDM indicates that the requested UE Identifier is not available in the subscription data, the NEF shall respond to the AF with a "404 Not Found" error status code with the response body including a `ProblemDetails` data structure containing the "cause" attribute set to the "UE_ID_NOT_AVAILABLE" application error to indicate that the AF specific UE ID is not available.

NOTE 6: The case where the UE's IP address provided by the AF to the NEF corresponds to an IP address that has been NATed (Network and Port Address Translation) is not supported in this release of the specification.

4.4.3 Procedures for Device Triggering

The procedures for device triggering as described in clause 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 clause 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 clause 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 clause 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];
- if the ExpectedUMT_5G feature as defined in clause 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 clause 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; and
- if the "UEId_retrieval" feature defined in clause 5.10.4 of 3GPP TS 29.122 [4] is supported, in order to support the AF specific UE ID retrieval:
 - 1) the AF may request AF specific UE ID retrieval for an individual UE, by providing the UE's IP address in the "ueIpAddr" attribute or the UE's MAC address in the "ueMacAddr" attribute within the CpInfo data type;
 - 2) the AF may also provide the DNN, within the "dnn" attribute, and/or the S-NSSAI, within the "snssai" attribute, within the CpInfo data type;
 - 3) upon reception of the corresponding request message from the AF:
 - if the AF's request is not authorized, the NEF shall respond to the AF with a "403 Forbidden" status code with the response body including the ProblemDetails data structure containing the "cause" attribute set to the "REQUEST_NOT_AUTHORIZED" application error indicating AF authorisation failure; and
 - if the AF's request is authorized by the NEF, then if the DNN and/or S-NSSAI information is not available in the request, the NEF shall determine the corresponding DNN and/or S-NSSAI information based on the received requesting AF Identifier, and if provided, the MTC Provider Information;
 - 4) the NEF shall interact using the the BSF with UE address and IP domain (if the UE IPv4 address is provided), DNN and/or S-NSSAI to retrieve the session binding information of the UE by invoking the Nbsf_Management_Discovery service operation as described in 3GPP TS 29.521 [9];
 - 5) if the NEF receives an error response from the BSF, the NEF shall respond to the AF with a proper error status code. If the NEF received from the BSF an error response including a "ProblemDetails" data structure with the "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error. If no SUPI matching the provided UE information is returned by the BSF, the NEF shall respond to the AF with a "404 Not Found" status code with the response body including a ProblemDetails data structure containing the "cause" attribute set to the "UE_NOT_FOUND" application error to indicate that the requested UE address is not found;
 - 6) upon success and a SUPI is returned by the BSF, the NEF shall interact with the UDM to retrieve the AF specific UE Identifier using the received SUPI and at least one of the Application Port ID, MTC Provider Information or AF Identifier information by invoking Nudm_SDM_Get service as described in clause 5.2.2.2 of 3GPP TS 29.503 [17];
 - 7) upon success, the UDM responds to the NEF with the AF specific UE Identifier represented as an External Identifier for the UE which is uniquely associated with the MTC provider Information and/or AF Identifier. The NEF shall then respond to the AF with the received information, i.e. the AF specific UE Identifier represented as an External Identifier that was received from the UDM;
 - 8) if the NEF receives an error response from the UDM, the NEF shall respond to the AF with a proper error status code. If the NEF received from the UDM an error response including a "ProblemDetails" data structure with the "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error. If the UDM indicates that the requested UE Identifier is not available in the subscription data, the NEF shall respond to the AF with a "404 Not Found" error status code with the response body including a ProblemDetails data structure containing the "cause" attribute set to the "UE_ID_NOT_AVAILABLE" application error to indicate that the AF specific UE ID is not available.

NOTE: The case where UE's IP address provided by the AF to the NEF corresponds to an IP address that has been NATed (Network and Port Address Translation) is not supported in this release of the specification.

4.4.6 Procedures for PFD Management

The procedures for PFD management as described in clause 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. If the EDGEAPP feature is supported and the "subscribedEvents" attribute is provided, the event reporting requirements may also be included within the "eventReq" attribute. 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 clause 4.4.7.2 if the request is identified by UE address or perform as described in clause 4.4.7.3 if the request is not identified by UE address.

If the EDGEAPP feature is supported and the "subscribedEvents" attribute is provided in the received HTTP POSTrequest, and immediate reporting was requested by the AF, then user plane path management report(s) shall be included in the HTTP POST response within the "eventReports" attribute, if available. They may also be included in the HTTP PUT/PATCH response, if available.

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 response from the BSF, the NEF shall not create the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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; and
- 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 received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 to store the received traffic influence parameters from the AF by invoking the `Nudr_DataRepository` service as described in 3GPP TS 29.504 [20] and 3GPP TS 29.519 [23]. If the NEF receives an error response 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. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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

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

4.4.7.4 Handling of UP path management event notification

If the NEF receives a UP path management event notification from the SMF indicating that the subscribed event has been detected, then the NEF shall provide a notification by sending an HTTP POST message that shall include the EventNotification data type at least with the subscribed event (e.g. UP Path has changed) to the AF identified by the notification destination received during creation or modification of the Individual Traffic Influence Subscription resource and, optionally, by the AF Transaction Identifier received during the creation of the Individual Traffic Influence Subscription resource. 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, and forward the AF acknowledgement to the SMF as described in 3GPP TS 29.508 [26].

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

The procedures for changing the chargeable party at session set up or during the session in 5GS are described in clause 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 "snsai" attribute;
- if the EthChgParty_5G feature as defined in clause 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 clause 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 clause 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 clause 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", periodic time for the reporting and, if the feature "PacketDelayFailureReport" is supported, the maximum period with no QoS measurement results reported 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; and
 - if the feature "PacketDelayFailureReport" is supported, the maximum period with no QoS measurement results reported within the "repPeriod" attribute.

If the NEF authorizes the AF request, the NEF may create a QoS monitoring notification correlation identifier for the AF transaction during the creation of the AF resource and may provision it together with the received QoS monitoring parameters to the PCF by invoking the Npcf_PolicyAuthorization service as defined in 3GPP TS 29.514 [7] or, if the "TSC_5G" feature is supported, to the TSCTSF by invoking the Ntsctsf_QoSandTSCAssistance service as defined in 3GPP TS 29.565 [50];

- when the NEF receives the event notification for the AF transaction as defined in clause 4.2.2 of 3GPP TS 29.508 [26] or clauses 4.2.4.12 and 4.2.5.14 of 3GPP TS 29.514 [7] or, if the "TSC_5G" feature is supported, clause 5.3.2.5.7 of 3GPP TS 29.565 [50], or when the AF requested direct notification, as defined in clause 5.2.2.3 of 3GPP TS 29.564 [61], 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; or
 - if the feature "PacketDelayFailureReport" is supported, the packet delay measurement failure indicator within the "pdmf" 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.

When the NEF interfaces directly with the PCF, 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 with "QOS_NOT_GUARANTEED" event and 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.

If the "TSC_5G" feature is supported, when the NEF interfaces with the TSCTSF, the NEF shall transfer the received alternative QoS references to the TSCTSF in the Ntsctsf_QoSandTSCAssistance service and subscribe with TSCTSF to "QOS_GUARANTEED" and "QOS_NOT_GUARANTEED" events. When the NEF receives the event notification from the TSCTSF, the NEF shall notify the AF with "QOS_GUARANTEED" event or with "QOS_NOT_GUARANTEED" event and the currently applied QoS reference if received. When the NEF receives the notification of TSCTSF 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 may include:
 - the input information to construct the TSC Assistance Container within the "tscaiInputUI" attribute and/or "tscaiInputDI" attribute;

And, if individual QoS parameters instead of QoS reference is provided, may include:

- requested GBR within the "reqGbrDI" attribute and/or "reqGbrUI" attribute;
- requested MBR within the "reqMbrDI" attribute and/or "reqMbrUI" attribute; and
- the maximum burst size within the "maxTscBurstSize" attribute;
- the priority within the "priority" attribute;
- the requested 5GS delay within the "req5Gsdelay" attribute.

If the NEF authorizes the AF request, the NEF may provision the received QoS requirements to the TSCTSF by invoking the Ntsctsf_QoSandTSCAssistance_Create/Update request as defined in 3GPP TS 29.565 [50]. The NEF determines whether to invoke the TSCTSF or to directly contact the PCF based on operator configuration. This determination may consider the AF identifier, whether the "tscaiInputUI" and/or "tscaiInputDI" attributes within the "tscQosReq" attribute were received in the subscription request, whether the "qosReference" attribute or individual QoS parameters within the "tscQosReq" attribute were received in the subscription request, and SLA between operator and application provider. A TSCTSF address may be locally configured in the NEF or the NEF uses the DNN/S-NSSAI (which may be provided in the request or determined based on the AF identifier) to discover the TSCTSF from the NRF. If the NEF directly contacts the PCF while the NEF determined to invoke the TSCTSF when authorizing the update request, the NEF shall reject the request message by sending an HTTP response to the AF with a status code set to 403 Forbidden and may include the "INVALID_SESSION_UPDATE" error in the "cause" attribute of the "ProblemDetails" structure and indicate which parameters can not be served in current session in the "invalidParams" attribute of the "ProblemDetails" structure.

NOTE 2: The NEF can determine whether the TSCTSF needs to be involved based on the DNN/S-NSSAI for the AF session according to the SLA.

- if the "AltQosWithIndParams_5G" feature is supported, the AF may include:
 - an ordered list of alternative service requirements that include individual QoS parameter sets within the "altQosReqs" 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. 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 requested packet delay budget within the "pdb" attribute;

If the NEF authorizes the AF request, and if the "TSC_5G" feature is supported, the NEF may provision the received QoS requirements and subscribe with to the TSCTSF to "QOS_GUARANTEED" and "QOS_NOT_GUARANTEED" events by invoking the Ntsctsf_QoSandTSCAssistance_Create request as defined in 3GPP TS 29.565 [50]. The NEF determines whether to invoke the TSCTSF or to directly contact the PCF based on operator configuration. This determination may consider the AF identifier, whether the "tscaiInputUI" and/or "tscaiInputDI" attributes within the "tscQosReq" attribute were received in the subscription request, whether the "qosReference" attribute or individual QoS parameters within the "altQosReqs" attribute were received in the subscription request, and SLA between operator and application provider. A TSCTSF address may be locally configured in the NEF or the NEF uses the DNN/S-NSSAI (which may be provided in the request or determined based on the AF identifier) to discover the TSCTSF from the NRF. When the NEF receives the notification of TSCTSF "QOS_GUARANTEED" event or "QOS_NOT_GUARANTEED" event, it shall notify the AF with "QOS_GUARANTEED" event or "QOS_NOT_GUARANTEED" event with the currently applied individual QoS parameter set within the "appliedQosRef" attribute if received. When the NEF receives the notification of the TSCTSF event "SUCCESSFUL_RESOURCES_ALLOCATION", it shall notify the AF the event together with the currently applied individual QoS parameter set within the "appliedQosRef" attribute if received. If the NEF directly contacts the PCF while the NEF determined to invoke the TSCTSF when authorizing the update request, the NEF shall reject the request message by sending an HTTP response to the AF with a status code set to 403 Forbidden and may include the "INVALID_SESSION_UPDATE" error in the "cause" attribute of the "ProblemDetails" structure and indicate which parameters can not be served in current session in the "invalidParams" attribute of the "ProblemDetails" structure.

NOTE 3: The NEF can determine whether the TSCTSF needs to be involved based on the DNN/S-NSSAI for the AF session according to the SLA.

When the NEF interfaces directly with the PCF, the NEF shall transfer the received QoS requirements 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 with the "QOS_NOT_GUARANTEED" event and 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.

- If the "eNB_5G" feature is supported, the AF may additionally subscribe the event(s) "ACCESS_TYPE_CHANGE" and/or "PLMN_CHG". If the NEF authorizes the AF request, the NEF shall subscribe the event(s) at the PCF by invoking the Npcf_PolicyAuthorization service operation.

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 clause 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 clause 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;
- the NEF shall interact with the UDM by using Nudm_ParameterProvision service as specified in 3GPP TS 29.503 [17]; and
- if the "UEId_retrieval" feature defined in clause 5.13.4 of 3GPP TS 29.122 [4] is supported, in order to support the AF specific UE ID retrieval:
 - 1) the AF may request AF specific UE ID retrieval for an individual UE, by providing the UE's IP address in the "ueIpAddr" attribute or the UE's MAC address in the "ueMacAddr" attribute within the NpConfiguration data type;
 - 2) the AF may also provide the DNN, within the "dnn" attribute, and/or the S-NSSAI, within the "snssai" attribute, within the NpConfiguration data type;
 - 3) upon reception of the corresponding request message from the AF:
 - if the AF's request is not authorized, the NEF shall respond to the AF with a "403 Forbidden" status code with the response body including the ProblemDetails data structure containing the "cause" attribute set to the "REQUEST_NOT_AUTHORIZED" application error indicating AF authorisation failure; and
 - if the AF's request is authorized by the NEF, then if the DNN and/or S-NSSAI information is not available in the request, the NEF shall determine the corresponding DNN and/or S-NSSAI information based on the received requesting AF Identifier, and if provided, the MTC Provider Information;
 - 4) the NEF shall then interact with the BSF with the UE address and IP domain (if the UE IPv4 address is provided), DNN and/or S-NSSAI to retrieve the session binding information of the UE by invoking the Nbsf_Management_Discovery service operation as described in 3GPP TS 29.521 [9];
 - 5) if the NEF receives an error response from the BSF, the NEF shall respond to the AF with a proper error status code. If the NEF received from the BSF an error response including a "ProblemDetails" data structure with the "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error. If no SUPI matching the provided UE information is returned by the BSF, the NEF shall respond to the AF with a "404 Not Found" status code with the response body including a ProblemDetails data structure containing the "cause" attribute set to the "UE_NOT_FOUND" application error to indicate that the requested UE address is not found;

- 6) upon success and a SUPI is returned by the BSF, the NEF shall interact with the UDM to retrieve the AF specific UE Identifier using the received SUPI and at least one of the Application Port ID, MTC Provider Information or AF Identifier information by invoking Nudm_SDM_Get service as described in clause 5.2.2.2 of 3GPP TS 29.503 [17];
- 7) upon success, the UDM responds to the NEF with an AF specific UE Identifier represented as an External Identifier for the UE which is uniquely associated with the MTC provider Information and/or AF Identifier. The NEF shall then respond to the AF with the received information, i.e. the AF specific UE Identifier represented as an External Identifier that was received from the UDM;
- 8) if the NEF receives an error response from the UDM, the NEF shall respond to the AF with a proper error status code. If the NEF received from the UDM an error response including a "ProblemDetails" data structure with the "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error. If the UDM indicates that the requested UE Identifier is not available in the subscription data, the NEF shall respond to the AF with a "404 Not Found" error status code with the response body including a ProblemDetails data structure containing the "cause" attribute set to the "UE_ID_NOT_AVAILABLE" application error to indicate that the AF specific UE ID is not available.

NOTE: The case where UE IP address provided by the AF to the NEF corresponds to an IP address that has been NATed (Network and Port Address Translation) is not supported in this release.

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 clause 5.5 is used and the procedure is described in clause 4.4.12.2.

4.4.12.2 NIDD configuration Triggered by the NEF

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

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

The AF shall acknowledge the HTTP POST request with an HTTP 200 OK response. Then the AF may start NIDD configuration procedure as described in clause 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 clause 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 clause 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 request message body shall include the AnalyticsExposureSubsc data structure that shall include:

- the URI where to receive the requested notifications as "notifUri" attribute;
- the 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 shall include for each event:
 - 1) an event identifier as "analyEvent" attribute.

The AnalyticsExposureSubsc data structure may include:

- event reporting requirement information as "analyRepInfo" attribute, which applies for all events in a subscription and may contain the following attributes:
 - 1) event notification method (periodic, one time, on event detection) as "notifMethod" attribute;
 - 2) maximum Number of Reports as "maxReportNbr" attribute;
 - 3) monitoring Duration as "monDur" attribute;
 - 4) repetition period for periodic reporting as "repPeriod" attribute;
 - 5) immediate reporting indication as "immRep" attribute;
 - 6) sampling ratio as "sampRatio" attribute;
 - 7) group reporting guard time as "grpRepTime" attribute;
 - 8) partitioning criteria for partitioning the impacted UEs before performing sampling as "partitionCriteria" attribute if the "EneNA" feature is supported; and
 - 9) a notification flag (used for muting and retrieving notifications) as "notifFlag" attribute if the "EneNA" feature is supported.

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;

- 2) identification of a group of UE(s) via a "exterGroupId" attribute; or
- 3) identification of any UE via the "anyUeInd" attribute.

Upon receipt of the HTTP POST request from the AF, if the AF is authorized, the NEF shall interact with the UDM by using Nudm_SubscriberDataManagement service as defined in 3GPP TS 29.503 [17] to translate the GPSI or external group identifier into the corresponding SUPI or internal group identifier. After receiving a successful response from the UDM, the NEF may perform further mappings and translations (e.g. map application identifiers to DNN and S-NSSAI information, or translate attributes of data type NetworkAreaInfo to attributes of data type LocationArea5G) and it shall interact with the NWDAF to subscribe to the subscription to the analytics information by using the Nnwdaf_EventsSubscription service as defined in 3GPP TS 29.520 [27]. If the NEF receives an error response from the NWDAF, the NEF shall not create the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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

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

Upon receipt of the HTTP PUT or DELETE request from the AF, if the AF is authorized, the NEF may perform further mappings and translations (e.g. map application identifiers to DNN and S-NSSAI information, or translate attributes of data type LocationArea5G to attributes of data type NetworkAreaInfo as required by the data model) and it shall interact with the NWDAF to modify or cancel the subscription to the analytics information by using the Nnwdaf_EventsSubscription service as defined in 3GPP TS 29.520 [27]. If the NEF receives an error response from the NWDAF, the NEF shall not update or delete the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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

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

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

If the NEF receives an analytics information notification from the NWDAF indicating that the subscribed analytics event has been detected, the NEF may perform further mappings and translations (e.g. translate attributes of data type NetworkAreaInfo to attributes of data type LocationArea5G as required by the data model), it may determine based on local configuration to hide from the Untrusted AF network internal information (e.g. DNN, S-NSSAI) which was included in the NWDAF notification, and it 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/modification 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.

When the "notifFlag" attribute is included during the creation of a subscription (HTTP POST request) and set to "DEACTIVATE", the NEF shall mute the event notification and store the available events.

When the "notifFlag" attribute is included during the update of a subscription (HTTP PUT request) and set to "DEACTIVATE", the NEF shall mute the event notification and store the available events; if it is set to the value "RETRIEVAL", the NEF shall send the stored events to the NF service consumer, mute the event notification again and store available events; if it is set to the value "ACTIVATE" and the event notifications are muted (due to a previously received "DECATIVATE" value), the NWDAF shall unmute the event notification, i.e. start sending again notifications for available events.

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 request message to the NEF targeting the custom operation URI "{apiRoot}/3gpp-analyticsexposure/v1/{afId}/fetch", the HTTP POST request message body shall include the AnalyticsRequest data structure that shall include:

- the identification of the analytics events, encoded within the "analyEvent" attribute;

and may include:

- the description of the analytics reporting information, encoded within the "analyRep" attribute;
- an event filter, encoded within the "analyEventFilter" attribute.
- the indication of the UEs to which the analytics request applies via either:
 - a) the identification of an individual UE via the "gpsi" attribute;
 - b) the identification of a group of UE(s) via the "exterGroupId" attribute; or
 - c) the 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 may perform further mappings and translations (e.g. map application identifiers to DNN and S-NSSAI information, or translate attributes of data type NetworkAreaInfo to attributes of data type LocationArea5G) and it shall interact with the NWDAF by using Nnwdaf_AnalyticsInfo service as defined in 3GPP TS 29.520 [27]. If the NEF receives an error response from the NWDAF, the NEF shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable. 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, attributes of data type NetworkAreaInfo to attributes of data type LocationArea5G), it may determine based on local configuration to hide from the Untrusted AF network internal information (e.g. DNN, S-NSSAI) which was included in the NWDAF response, and it shall 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 clause 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 clause 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 response 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. If the NEF received within an error response a

"ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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; and
- 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 clause 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 request message body shall include the IptvConfigData data structure that 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; and
- 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 response 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. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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; and
- 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 clause 5.10.2.3.2. The External Group Identifier or GPSI shall remain unchanged from previous values.

If the "PatchUpdate" feature defined in clause 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 request message body shall include the ServiceParameterData data structure that 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, the DNN, S-NSSAI and/or Application Identifier information can be provided in the "urspGuidance" attribute, hence 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; and
- service parameters for at least one of the following:
 - 1)V2X service parameters via:
 - a) configuration parameters for V2X communications over PC5 within the "paramOverPc5" attribute; and
 - b) configuration parameters for V2X communications over Uu within the "paramOverUu" attribute;
 - 2)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; and
 - 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; and
 - 3)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, a relative precedence within the "relatPrecedence" attribute and/or 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 clause 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 response 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. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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; and
- 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 one or more AfNotification data structure(s). 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 clause 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 clause 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 clause 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 if "anonInd" attribute contained in AkmaAfKeyRequest data type is not set to "true" in the incoming request, optionally the GPSI (external ID) which may be translated from the SUPI received from the AAnF. The SUPI shall not be included in the response to the external AF. If the NEF receives an error response 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. For (g)PTP operation, the Time synchronization service allows an AF to subscribe to the UE and 5GC capabilities and availability for time synchronization service (as described in clause 4.4.24.1) and to configure the (g)PTP instance in 5GS as described in clause 4.4.24.2. For 5G access stratum based time distribution, the AF can influence the 5G access stratum time distribution as described in clause 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 with each other by the AF. However, the (g)PTP instance activation, modification, and deactivation can influence the 5G access stratum time distribution for the UEs that are part of the impacted PTP instance.

4.4.24.1 Subscription and unsubscription to notification of Time Synchronization Capabilities

The procedures are used by the AF to subscribe to notifications and to explicitly cancel a previous subscription to notification of capabilities of the time synchronization service for a list of UE(s), a group of UEs or any UE using a DNN/S-NSSAI combination via the NEF.

In order to subscribe to the notification of capabilities of UE and 5GC, and 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 request message body shall include the TimeSyncExposureSubsc data structure that shall include:

- one of the indication of the UEs to which the time synchronization capabilities is requested via:
 - 1) identification of a list of individual UEs within a "gpsis" attribute;
 - 2) indication of any UE within the "anyUeInd" attribute if DNN and S-NSSAI are provisioned; or
 - 3) identification of a group of UE(s) via a "exterGroupId" attribute.
- subscription to event(s) notification as "subscribedEvents" attribute when the NF service consumer needs to subscribe to notifications;
- notification URI within the "subsNotifUri" attribute; and
- 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 "notifMethod" attribute;
- maximum number of reports within the "maxReportNbr" attribute;
- expiry time within the "expiry" attribute; and
- report period within the "repPeriod" attribute.

Upon the reception of an HTTP POST request, if the AF is authorized, the NEF shall select a TSCTSF based on the local configuration or discover the TSCTSF via Nnrf_NFDiscovery service as defined in 3GPP TS 29.510 [57] for a DNN/S-NSSAI combination, if not configured. If the DNN and the S-NSSAI is omitted in the AF request, prior the TSCTSF discovery the NEF shall determine the corresponding DNN and S-NSSAI based on the received AF Service Identifier. After the NEF obtains the TSCTSF, the NEF shall invoke the Ntsctsf_TimeSynchronization_CapsSubscribe request service operation as defined in clause 5.2.2.2.2 of 3GPP TS 29.565 [50] to the selected TSCTSF. If the NEF receives an error response from the TSCTSF, the NEF shall not create the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

NOTE: It is assumed that there is only one TSCTSF set for a given DNN/S-NSSAI in this release of the specification.

After receiving a successful response from the TSCTSF, the NEF shall 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 "Individual Time Synchronization Exposure Subscription".

In order to update an existing subscription, the AF shall send an HTTP PUT message to the NEF targeting the resource "Individual Time Synchronization Exposure Subscription". The body of the HTTP PUT request message shall include the TimeSyncExposureSubsc data type. Upon receipt of the corresponding HTTP PUT message, if the AF is authorized

by the NEF, the NEF shall interact with the TSCTSF by invoking `Ntsctsf_TimeSynchronization_CapsSubscribe` request service operation as defined in clause 5.2.2.2.3 of 3GPP TS 29.565 [50]. After receiving a successful response from the TSCTSF, the NEF shall update a resource "Individual Time Synchronization Exposure Subscription" which represents the exposure subscription, and responds to the AF with a 200 OK with `TimeSyncExposureSubsc` data structure or 204 No Content status code.

When the NEF receives the notification of the capabilities of the time synchronization service from the TSCTSF as defined in clause 5.2.2.4.2 of 3GPP TS 29.565 [50], the NEF shall provide a notification to AF by sending HTTP POST message that includes 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.

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". The NEF shall interact with the TSCTSF by invoking the `Ntsctsf_TimeSynchronization_CapsUnsubscribe` service operation as defined in clause 5.2.2.3.2 of 3GPP TS 29.565 [50] 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 clause 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 or group of UEs.

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 as defined in clause 5.22.4.3.2.

Upon receipt of the corresponding HTTP POST message and the request is authorized by the NEF, the NEF shall select a TSCTSF based on the local configuration or discover the TSCTSF via Nnrf_NFDiscovery service as defined in 3GPP TS 29.510 [57] for the GPSI or external group identifier, if not configured. After the NEF obtains the TSCTSF, the NEF invokes the Ntsctsf_ASTI_Create service operation with the corresponding TSCTSF, if available, 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. If the NEF receives an error response from the TSCTSF, the NEF shall not create the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 the AccessTimeDistributionData data type.

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__ASTI_Update 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 response with AccessTimeDistributionData data structure or "204 No Content" status code. If the NEF receives an error code from the TSCTSF, the NEF shall not update the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 ASTI Configuration at the TSCTSF by using Ntsctsf_ASTI_Delete 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. If the NEF receives an error response from the TSCTSF, the NEF shall not delete the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

AF may request and query the status of the access stratum time distribution sending the HTTP POST request, "retrieve" custom operation, to the resource "ASTI Configurations". The body of the HTTP POST request message shall include the StatusRequestData data type as defined in clause 5.22.4.3.3.

Upon receipt of the corresponding HTTP POST message, if the AF is authorized, the NEF shall interact with the TSCTSF by using Ntsctsf_ASTI_Get 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 clause 5.22.4.3.4 in the payload. If the NEF receives an error response from the TSCTSF, the NEF shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 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 request message body shall include the AppAmContextExpData data structure that 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; and
- 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 "Individual application AM Context" and assign an application AM context 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 application AM Context" resource to the AF.

If the NEF receives an error response from the PCF, the NEF shall not create the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 clause 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 response from the PCF, the NEF shall not modify the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 response from the PCF, the NEF shall take proper error handling action and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 the 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 or HTTP "204 No Content" response code 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 response 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. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 response from the PCF, the NEF shall take proper error handling action and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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, 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 response from the UDR, the NEF shall not create the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 response from the UDR, the NEF shall not update the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 response from the UDR, the NEF shall take proper error handling actions and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 request message body shall include the EasDeployInfo data structure that shall include:

- FQDN(s) of an application deployed in the Local part of the DN via an "fqdnPatternList" 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; and
- list of DNS server identifier and/or IP address(s) of the EAS in the local DN for each DNAI as "dnaiInfos" 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 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 and the NEF may derive DNN and S-NSSAI from the AF Service Identifier if not received explicitly. Then 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 29.504 [20]. 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 contents of the created EAS Deployment Information resource in the response body and a Location header field containing the URI of the created individual EAS Deployment Information resource. If the NEF receives an error response from the UDR, the NEF shall not create the resource and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 29.504 [20] 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 response 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. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 29.504 [20] 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 response from the UDR, the NEF shall take proper error handling actions and shall respond to the AF with a proper error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.28.5 Deletion of EAS Deployment Information based on given criteria

In order to delete existing EAS Deployment Information resource(s) which match given attributes, the NF service consumer shall send an HTTP POST request with "{apiRoot}/3gpp-eas-deployment/<apiVersion>/remove-edis" as URI. The POST request body shall contain an EdiDeleteCriteria data structure. The EdiDeleteCriteria data structure provided in the request body shall include at least one of the following:

- an AF identifier within the "afId" attribute;
- DNN and slice information within the "dnnSnsai" attribute;

Upon the reception of this HTTP POST request, if the NF service consumer is authorized by the NEF to delete the EAS Deployment Information, the NEF shall determine the EAS Deployment Information resources that match the provided criteria and interact with the UDR to delete the associated EAS Deployment Information by using the Nudr_DataRepository service as defined in 3GPP TS 29.504 [20]. If the request is accepted by the UDR and the UDR informs the NEF with a successful response, the NEF shall send a HTTP "204 No Content" response. If the NEF receives an error code from the UDR, the NEF shall respond to the AF with a proper error status code.

4.4.29 Procedures for MBS Management

4.4.29.1 General

The procedures described in the clauses below are used by an AF to interact with the 5GC for MBS management as defined in 3GPP TS 23.247 [53] and 3GPP TS 26.502 [65], in order to carry out the following procedures:

- MBS TMGI management procedures.

- MBS Session management procedures.
- MBS User Service management procedures.
- MBS User Data Ingest Session management procedures.

4.4.29.2 Procedures for MBS TMGI management

4.4.29.2.1 General

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

4.4.29.2.2 Procedure for MBS TMGI(s) allocation or MBS 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 MBS 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 MBS 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 that 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);
- within the "suppFeat" attribute, the features supported by the AF, if feature negotiation needs to take place;

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 "websocketNotifConfig" attribute, the configuration parameters to set up notification delivery over WebSocket protocol, if the "Notification_websocket" feature is supported; and/or
- within the either "mbsServiceArea" attribute or the "extMbsServiceArea" attribute, the MBS service area for the TMGI(s) to be allocated, which may be needed for a local MBS service.

The NEF shall then check whether the AF is authorized to perform this operation or not as defined in clause 6.1.1 of 3GPP TS 23.247 [53]. If the AF is authorized, then:

- if the MBS Service Area information is provided via the "extMbsServiceArea" attribute, the NEF shall translate the received geographical area(s) or civic address(es) to a list of TAI(s) and/or cell ID(s);
- the NEF shall determine the target MB-SMF either by querying the NRF to discover and select an MB-SMF (service) instance that can handle this request, or based on local configuration; and
- the NEF shall convey this MBS TMGI(s) allocation request or expiry time refresh request to the selected MB-SMF using the Nmbsmf_TMGI service API as defined in 3GPP TS 29.532 [52].

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

- within the "tmgiInfo" attribute, the MBS TMGI(s) allocation information or the refreshed expiry time for already allocated MBS TMGI(s); and
- within the "suppFeat" attribute, the features supported by both the AF and the NEF, if feature negotiation needs to take place and the AF provided the list of its supported features in the corresponding request body.

On failure or if the NEF receives an error response from the MB-SMF, the NEF shall take proper error handling actions, as specified in clause 5.19.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.29.2.3 Procedure for MBS TMGI(s) deallocation

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

In order to request the deallocation of previously allocated MBS 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 MBS 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 clause 6.1.1 of 3GPP TS 23.247 [53]. If the AF is authorized, the NEF shall convey this MBS TMGI(s) deallocation request to the MB-SMF using the Nmbsmf_TMGI service API as defined in 3GPP TS 29.532 [52].

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

On failure or if the NEF receives an error response from the MB-SMF, the NEF shall take proper error handling actions, as specified in clause 5.19.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.29.2.4 Procedure for MBS TMGI(s) timer expiry notification

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

In order to notify an AF of timer expiry for previously allocated MBS 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 MBS 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.

On failure, the AF shall take proper error handling actions, as specified in clause 5.19.7, and respond to the NEF with an appropriate error status code.

4.4.29.3 Procedures for MBS session management

4.4.29.3.1 General

The procedures described in the clauses below are used by an AF to create, update or delete MBS session(s) and to subscribe to / unsubscribe from MBS Session Status event(s) reporting at the NEF.

This service is applicable for both broadcast and multicast sessions or, for a location dependent MBS session, the part of an MBS Session within an MBS service area, 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 or, for a location dependent MBS session, the part of an MBS Session within an MBS service area.

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);
- within the "locationDependent" attribute, the location dependent MBS session indication, if the request is related to a location dependent MBS;

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, for a location dependent MBS session or a local MBS session;
 - within the "activationTime" attribute, the MBS session activation time;
 - within the "terminationTime" attribute, the MBS session termination time;
 - within the "mbsServInfo" attribute, the MBS Service Information for the MBS session; and
 - within the "mbsSessionSubsc" attribute, the parameters to request the creation of a subscription to MBS session status event(s) reporting;
- for a multicast MBS session:
 - within the "activityStatus" attribute, the MBS session activity status (i.e. active or inactive); and
 - within the "anyUeInd" attribute, the indication of whether any UE may join the MBS session;
- for a broadcast MBS session:
 - within the "mbsFsaIdList" attribute, the list of MBS frequency selection area Identifiers (i.e. FSA IDs).

At the reception of this HTTP POST request for MBS session creation:

- the NEF may decide to interact with the PCF for MBS policy authorization of the received MBS Service Information;
- if the NEF decides to interact with the PCF, then:
 - if the NEF did not receive an MBS Session Identifier or received a TMGI allocation request within the "tmgiAllocReq" attribute, the NEF shall request TMGI allocation to the MB-SMF using the Nmbsmf_TMGI service API, as specified in 3GPP TS 29.532 [52];
 - if the received MBS Session Creation request is for the creation of an MBS Session that is part of a location dependent MBS, i.e. the "locationDependent" attribute is present and set to "true", and there is a need to select the same PCF for all the MBS Sessions composing the location dependent MBS, the NEF shall interact with the BSF using the Nbsf_Management service API to check whether there is already a PCF serving the MBS Sessions of the location dependent MBS based on the MBS Session Identifier, as specified in 3GPP TS 29.532 [52]. Then:

NOTE 1: Interacting with the BSF to discover whether there is already a PCF serving the MBS Session is not necessary in a deployment with a single PCF.

- if there is a PCF already serving the MBS Sessions of the location dependent MBS, the NEF shall use this PCF for MBS policy authorization of the received MBS Service Information;
- if there is no PCF already serving the MBS Sessions of the location dependent MBS or the NEF did not interact with the BSF, the NEF shall interact with the NRF using the Nnrf_NFDiscovery service API to discover a PCF (service) instance to serve the MBS Session possibly based on the MBS Session Identifier, as specified in 3GPP TS 29.510 [57];
- the NEF shall then interact with the selected PCF (service) instance using the Npcf_MBSPolicyAuthorization service API for MBS policy authorization of the received MBS Service Information and the creation of a corresponding MBS Application Session Context at the PCF, as specified in 3GPP TS 29.537 [63]; and
- if MBS session authorization is successful or when the NEF decides to not interact with the PCF for MBS policy authorization, the NEF shall interact with the MB-SMF using the Nmbsmf_MBSSession service API to request the creation of a corresponding MBS session at the MB-SMF as specified in 3GPP TS 29.532 [52]; and
- if the MBS Service Area information is provided within the "extMbsServiceArea" attribute, the NEF shall translate the received geographical area(s) or civic address(es) to a list of cell ID(s) and/or list of TAI(s) before relaying it to the MB-SMF.

Upon reception of a successful response from the MB-SMF and successful MBS session creation at the NEF, the NEF shall return a Nnef_MBSSession_Create response with an HTTP "201 Created" status code to the AF including a "Location" header that shall contain the URI of the created "Individual MBS Session" resource, and the response body including the MbsSessionCreateRsp data structure that shall contain:

- within the "mbsSession" attribute, a representation of the created Individual MBS Session resource encoded using the MbsSession data structure, including:
 - the area session ID assigned by the MB-SMF in the case of a location dependent MBS within the "areaSessionId" attribute of the MbsSession data structure;
 - the allocated TMGI for the MBS session, if the MBS session creation request included a "tmgiAllocReq" attribute requesting TMGI allocation for the MBS session, within the "tmgi" attribute;
 - if unicast transport is used over N6mb/Nmb9, the ingress MB-UPF tunnel information, within the "ingressTunAddr" attribute;
 - if the "serviceType" value is "BROADCAST" and any MBS FSA ID(s) received from the MB-SMF, the list of MBS FSA ID(s) within the "mbsFsaIdList" attribute.
- within the "eventList" attribute, a list of MBS Session Status Event(s) report(s), if available.

If the MBS session creation request contained a request to also create a subscription to MBS session status event(s) within the "mbsSessionSubsc" attribute, the the NEF shall also create a corresponding "Individual MBS Session Subscription" resource and return a representation of it in the HTTP POST response body within the "mbsSessionSubsc" attribute of the MbsSession data structure. The "mbsSessionSubsc" attribute shall contains the identifier of the created "Individual MBS Session Subscription" resource within the "subscriptionId" attribute. The AF shall construct the URI of the created "Individual MBS Session Subscription" resource by appending the path segments "/subscriptions/{subscriptionId}", where the "subscriptionId" takes the value of the received "subscriptionId" attribute, to the URI of the created "Individual MBS Session" resource received within the HTTP Location header.

On failure or if the NEF receives an error code from the PCF, the NRF or the MB-SMF, the NEF shall take proper error handling actions, as specified in clause 5.20.7, and respond to the AF with an appropriate error status code,. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 or, for a location dependent MBS session, the part of an MBS Session within an MBS service area.

In order to request the modification of an existing MBS Session, an AF shall send a Nnef_MBSSession_Update request using the HTTP PATCH method and 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. For a multicast or a broadcast MBS session, only the "mbsServiceArea" attribute, and/or the "mbsServInfo" attribute may be modified. For a multicast MBS session, the "activityStatus" attribute may also be modified. For a broadcast MBS session, the "mbsFsaIdList" attribute may also be modified.

At the reception of this HTTP PATCH request for MBS session modification:

- if updated MBS Service Information is provided and the NEF decided to interact with the PCF during MBS Session Creation as specified in clause 4.4.29.3.2, the NEF shall also interact with the PCF for MBS policy authorization of the received updated MBS Service Information and the update of the corresponding MBS Application Session Context, as specified in 3GPP TS 29.537 [63];
- if MBS session authorization is successful or when the NEF does not interact with the PCF, the NEF shall interact with the MB-SMF to request the modification of the corresponding MBS session at the MB-SMF as specified in 3GPP TS 29.532 [52];
 - if the NEF receives an "indication that the PCF shall be contacted" within the "contactPcfInd" attribute from the PCF as specified in 3GPP TS 29.537 [63], the NEF shall relay this indication to the MB-SMF;

and

- if updated MBS Service Area information is provided within the "extMbsServiceArea" attribute, the NEF shall translate the received geographical area(s) or civic address(es) to a list of cell ID(s) and/or list of TAI(s) before relaying it to the MB-SMF.

Upon reception of a successful response from the MB-SMF and successful MBS session modification, the NEF shall return a Nnef_MBSSession_Update response with an HTTP "204 No Content" status code.

On failure or if the NEF receives an error response from the PCF or the MB-SMF, the NEF shall take proper error handling actions, as specified in clause 5.20.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

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 or, for a location dependent MBS session, the part of an MBS Session within an MBS service area.

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 and targeting the URI of the corresponding "Individual MBS Session" resource.

At the reception of this HTTP DELETE request for MBS session deletion:

- if the NEF decided to interact with the PCF during MBS Session Creation as specified in clause 4.4.29.3.2, the NEF shall also interact with the PCF to request the deletion of the corresponding MBS Application Session Context, as specified in 3GPP TS 29.537 [63]; and
- the NEF shall interact with the MB-SMF to request the deletion of the corresponding MBS Session.

Upon success, the NEF shall return a Nnef_MBSSession_Delete response with an HTTP "204 No Content" status code. On failure or if the NEF receives an error response from the PCF or the MB-SMF, the NEF shall take proper error handling actions, as specified in clause 5.20.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.29.3.5 Procedure for MBS session status subscription

This procedure is used by an AF to request to create a subscription to MBS session status event(s) reporting for a multicast or a broadcast MBS session or, for a location dependent MBS session, the part of an MBS Session within an MBS service area.

In order to request the creation of a new subscription to MBS Session status event(s) reporting, an AF shall send a Nnef_MBSSession_StatusSubscribe request to the NEF using the HTTP POST method and targeting the "MBS Session Subscriptions" collection 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.

On failure or if the NEF receives an error response from the MB-SMF, the NEF shall take proper error handling actions, as specified in clause 5.20.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.29.3.6 Procedure for MBS session status unsubscription

This procedure is used by an AF to request the deletion of an existing subscription to MBS session status event(s) reporting for a multicast or a broadcast MBS session or, for a location dependent MBS session, the part of an MBS Session within an MBS service area.

In order to request the deletion of an existing subscription to MBS Session status event(s) reporting, an AF shall send a Nnef_MBSSession_StatusUnsubscribe request to the NEF using the HTTP DELETE method and 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.

On failure or if the NEF receives an error response from the MB-SMF, the NEF shall take proper error handling actions, as specified in clause 5.20.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.29.3.7 Procedure for MBS session status notification

This procedure is used by the NEF to send MBS session status event(s) notifications to a previously subscribed AF.

In order to send an MBS Session status event(s) notification, the NEF shall send a Nnef_MBSSession_StatusNotify request to the AF using the HTTP POST method and targeting the notification URI provided by the AF during the corresponding MBS session subscription creation/modification, with the request body including the MbsSessionStatusNotif data structure that shall contain:

- within the "eventList" attribute, the reported MBS session event(s) and the related information, encoded via the MbsSessionEventReportList data structure that shall contain:
 - within the "eventReportList" attribute, one or several MBS session event report(s), with each one of them encoded using the MbsSessionEventReport data structure that shall contain:
 - within the "eventType" attribute, the reported MBS session status event;
 - within the "timeStamp" attribute, the time at which the event is generated, if available;
 - within the "ingressTunAddrInfo" attribute, the ingress tunnel address to use to send MBS session data over N6mb/Nmb9 interface, if the "eventType" attribute is set to "INGRESS_TUNNEL_ADD_CHANGE";

and

- within the "eventList" attribute, the list of MBS session events to be reported, encoded via the MbsSessionEventReportList data structure that shall contain:
 - within the "eventReportList" attribute, one or several individual MBS session event report(s), with each one of them encoded within the MbsSessionEventReport data structure that shall contain:

- within the "broadcastDelStatus" attribute, the broadcast delivery status (e.g. whether the MBS session is ACTIVATED or TERMINATED), if the "eventType" attribute is set to "BROADCAST_DELIVERY_STATUS".

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

On failure, the AF shall take proper error handling actions, as specified in subclause 5.20.7, and respond to the NEF with an appropriate error status code.

4.4.29.4 Procedures for MBS Parameters Provisioning

4.4.29.4.1 General

The procedures described in the clauses below are used by an AF to perform MBS parameters provisioning, e.g. multicast MBS Session Authorization information provisioning as defined in clause 7.2.9 of 3GPP TS 23.247 [53].

4.4.29.4.2 Procedure for multicast MBS Session Authorization information provisioning

This procedure is used by an AF to request the creation/update/deletion of an MBS Session Authorization information provisioning for a multicast MBS group.

In order to request the creation of an MBS Parameters Provisioning for the purpose of MBS Session Authorization information provisioning for a multicast MBS group, an AF shall trigger the Nnef_MBSSession API by sending an HTTP POST request to the NEF targeting the "MBS Parameters Provisionings" collection resource, with the request body including the MbsPpData data structure that shall contain:

- within the "afId" attribute, the identifier of the AF that is sending the request;
- within the "mbsSessAuthData" attribute, the MBS Session Authorization information data to be provisioned, encoded via the MbsSessAuthData data structure that shall contain:
 - within the "extGroupId" attribute, the external group identifier of the targeted multicast MBS Group; and
 - within the "gpsisList" attribute, the list of the GPSI(s) of the member UE(s) constituting the multicast MBS group, if the multicast MBS group has not yet been created or the list of its member(s) needs to be updated; and
 - within the "mbsSessionIdList" attribute, the identifier(s) of the multicast MBS Session(s) that the multicast MBS group is authorized to join;

and

- within the "suppFeat" attribute, the features supported by the AF, if applicable (i.e. feature negotiation needs to take place).

The NEF shall then check whether the AF is authorized to perform this operation or not as defined in clause 7.2.9 of 3GPP TS 23.247 [53]. If the AF is authorized, the NEF shall trigger the Nudm_ParameterProvision service API of the UDM to request the provisioning of the received MBS Session Authorization information.

Upon reception of a successful response from the UDM as defined in 3GPP TS 29.503 [17], the NEF shall respond to the AF with an HTTP "200 OK" status code including a Location header field containing the URI of the created resource, and the response body containing the MbsPpData data structure containing a representation of the created "Individual MBS Parameters Provisioning" resource.

In order to request the update of an existing "Individual MBS Parameters Provisioning" resource for the purpose of MBS Session Authorization information provisioning for a multicast MBS group, an AF shall trigger the Nnef_MBSSession API by sending to the NEF either:

- an HTTP PUT request targeting the concerned "Individual MBS Parameters Provisioning" resource with the request body including the MbsPpData data structure; or
- an HTTP PATCH request targeting the concerned "Individual MBS Parameters Provisioning" resource with the request body including the MbsPpDataPatch data structure.

After authorizing the request, the NEF shall interact with the UDM via the the Nudm_ParameterProvision service API to request the provisioning of the received updated MBS Session Authorization information.

Upon reception of a successful response from the UDM as defined in 3GPP TS 29.503 [17], the NEF shall respond to the AF with an HTTP "200 OK" status code with the response body containing a representation of the updated Individual MBS Parameters Provisioning resource within the MbsPpData data structure, or an HTTP "204 No Content" status code.

In order to request the deletion of an existing "Individual MBS Parameters Provisioning" resource for the purpose of MBS Session Authorization information provisioning for a multicast MBS group, an AF shall trigger the Nnef_MBSSession API by sending an HTTP DELETE request targeting the concerned "Individual MBS Parameters Provisioning" resource to the NEF. After authorizing the request, the NEF shall interact with the UDM via the the Nudm_ParameterProvision service API to request to update accordingly the MBS Session Authorization information.

Upon reception of a successful response from the UDM as defined in 3GPP TS 29.503 [17], the NEF shall respond to the AF with an HTTP "204 No Content" status code.

On failure or if the NEF receives an error code from the UDM, the NEF shall take proper error handling actions, as specified in clause 5.20.7, and respond to the AF with an appropriate error status code.

NOTE: The stage 2 Nnef_ParameterProvisioning API for MBS Parameters Provisioning is implemented in stage 3 via the Nnef_MBSSession API.

4.4.29.5 Procedures for MBS User Service management

4.4.29.5.1 General

The procedures described in the clauses below are used by an external/untrusted AF (e.g. MBS Application Provider that lies outside the trusted DN) to manage MBS User Services via the NEF, i.e. create, retrieve, update and delete an MBS User Service, as defined in 3GPP TS 26.502 [65].

4.4.29.5.2 Procedure for MBS User Service creation

This procedure is used by an AF to request the creation of a new MBS User Service at the NEF.

In order to request the creation of an MBS User Service, an AF shall send a Nnef_MBSUserService_Create request to the NEF using the HTTP POST method and targeting the "MBS User Services" collection resource, with the request message body including the MBSUserService data structure, as specified in clause 5.26.2.2.3.2.

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized, the NEF shall then trigger the Nmbsf_MBSUserService service API of the MBSF to request the creation of the corresponding MBS User Service at the MBSF, as specified in 3GPP TS 29.580 [66].

Upon reception of a successful response from the MBSF, as defined in 3GPP TS 29.580 [66], the NEF shall return a Nnef_MBSUserService_Create response with an HTTP "201 Created" status code including a "Location" header field that shall contain the URI of the created resource, and the response body containing a representation of the created "Individual MBS User Service" resource within the MBSUserService data structure, as specified in clause 5.26.2.2.3.2.

On failure or if the NEF receives an error response from the MBSF, the NEF shall take proper error handling actions, as specified in clause 5.26.7, and respond to the AF with an appropriate error status code.

4.4.29.5.3 Procedure for MBS User Service retrieval

This procedure is used by an AF to request the retrieval of an existing MBS User Service at the NEF.

In order to request the retrieval of an existing MBS User Service, an AF shall send a Nnef_MBSUserService_Retrieve request using the HTTP GET method and targeting the URI of the concerned "Individual MBS User Service" resource, as specified in clause 5.26.2.3.3.1.

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized, the NEF shall then trigger the Nmbsf_MBSUserService service API of the MBSF to request the retrieval of the corresponding MBS User Service at the MBSF, as specified in 3GPP TS 29.580 [66].

Upon reception of a successful response from the MBSF, as defined in 3GPP TS 29.580 [66], the NEF shall return a Nnef_MBSUserService_Retrieve response with an HTTP "200 OK" status code and the response body containing a representation of the requested Individual MBS User Service resource within the MBSUserService data structure, as specified in clauses 5.26.2.3.3.1.

On failure or if the NEF receives an error code from the MBSF, the NEF shall take proper error handling actions, as specified in clause 5.26.7, and respond to the AF with an appropriate error status code.

4.4.29.5.4 Procedure for MBS User Service update/modification

This procedure is used by an AF to request the update/modification of an existing MBS User Service at the NEF.

In order to request the update of an existing MBS User Service, an AF shall send a Nnef_MBSUserService_Update request using the HTTP PUT method and targeting the URI of the corresponding "Individual MBS User Service" resource, with the request body including the MBSUserService data structure, as specified in clause 5.26.2.3.3.2.

In order to request the modification of an existing MBS User Service, an AF shall send a Nnef_MBSUserService_Update request using the HTTP PATCH method and targeting the URI of the corresponding "Individual MBS User Service" resource, with the request body including the MBSUserServicePatch data structure, as specified in clause 5.26.2.3.3.3.

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized, the NEF shall then trigger the Nmbsf_MBSUserService service API of the MBSF to request the update/modification of the corresponding MBS User Service at the MBSF, as specified in 3GPP TS 29.580 [66].

Upon reception of a successful response from the MBSF, as defined in 3GPP TS 29.580 [66], the NEF shall return a Nnef_MBSUserService_Update response with an HTTP "200 OK" status code with the response body containing a representation of the updated Individual MBS User Service resource within the MBSUserService data structure, or an HTTP "204 No Content" status code, as specified in clause 5.26.2.3.3.2 or clause 5.26.2.3.3.3.

On failure or if the NEF receives an error code from the MBSF, the NEF shall take proper error handling actions, as specified in clause 5.26.7, and respond to the AF with an appropriate error status code.

4.4.29.5.5 Procedure for MBS User Service deletion

This procedure is used by an AF to request the deletion of an existing MBS User Service at the NEF.

In order to request the deletion of an existing MBS User Service, an AF shall send a Nnef_MBSUserService_Delete request using the HTTP DELETE method and targeting the URI of the concerned "Individual MBS User Service" resource, as specified in clause 5.26.2.3.3.4.

NOTE: The Nnef_MBSUserService_Delete service operation corresponds to the stage 2 Nnef_MBSUserService_Destroy service operation defined in 3GPP TS 26.502 [65].

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized, the NEF shall then trigger the Nmbsf_MBSUserService service API of the MBSF to request the deletion of the corresponding MBS User Service at the MBSF, as specified in 3GPP TS 29.580 [66].

Upon reception of a successful response from the MBSF, as defined in 3GPP TS 29.580 [66], the NEF shall return a Nnef_MBSUserService_Delete response with an HTTP "204 No Content" status code, as specified in clause 5.26.2.3.3.4.

On failure or if the NEF receives an error code from the MBSF, the NEF shall take proper error handling actions, as specified in clause 5.26.7, and respond to the AF with an appropriate error status code.

4.4.29.6 Procedures for MBS User Data Ingest Session management

4.4.29.6.1 General

The procedures described in the clauses below are used by an external/untrusted AF (e.g. MBS Application Provider that lies outside the trusted DN) to manage an MBS User Data Ingest Session along with its subordinate MBS Distribution Session(s) via the NEF, i.e. create, retrieve, update/modify and delete an MBS User Data Ingest Session,

create, retrieve, update/modify and delete an MBS User Data Ingest Session Status subscription, and manage the related MBS User Data Ingest Session Status notifications, as defined in 3GPP TS 26.502 [65].

4.4.29.6.2 Procedure for MBS User Data Ingest Session creation

This procedure is used by an AF to request the creation of a new MBS User Data Ingest Session at the NEF.

In order to request the creation of an MBS User Data Ingest Session, including a set of subordinate MBS Distribution Session(s), an AF shall send a `Nnef_MBSUserDataIngestSession_Create` request message to the NEF using the HTTP POST method and targeting the "MBS User Data Ingest Sessions" collection resource, with the request message body including the `MBSUserDataIngestSession` data structure, as specified in clause 5.27.2.2.3.2.

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized, the NEF shall then trigger the `Nmbsf_MBSUserDataIngestSession` API of the MBSF to request the creation of the corresponding MBS User Data Ingest Session at the MBSF, as specified in 3GPP TS 29.580 [66].

Upon reception of a successful response from the MBSF, as defined in 3GPP TS 29.580 [66], the NEF shall return a `Nnef_MBSUserDataIngestSession_Create` response message with an HTTP "201 Created" status code including a "Location" header field that shall contain the URI of the created resource, and the response body containing a representation of the created "Individual MBS User Data Ingest Session" resource within the `MBSUserDataIngestSession` data structure, as specified in clause 5.27.2.2.3.2.

On failure or if the NEF receives an error response from the MBSF, the NEF shall take proper error handling actions, as specified in clause 5.27.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a `ProblemDetails` data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.29.6.3 Procedure for MBS User Data Ingest Session retrieval

This procedure is used by an AF to request the retrieval of an existing MBS User Data Ingest Session at the NEF.

In order to request the retrieval of an existing MBS User Data Ingest Session, an AF shall send a `Nnef_MBSUserDataIngestSession_Retrieve` request message using the HTTP GET method and targeting the URI of the concerned "Individual MBS User Data Ingest Session" resource, as specified in clause 5.27.2.3.3.1.

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized, the NEF shall then trigger the `Nmbsf_MBSUserDataIngestSession` service API of the MBSF to request the retrieval of the corresponding MBS User Data Ingest Session at the MBSF, as specified in 3GPP TS 29.580 [66].

Upon reception of a successful response from the MBSF, as defined in 3GPP TS 29.580 [66], the NEF shall return a `Nnef_MBSUserDataIngestSession_Retrieve` response message with an HTTP "200 OK" status code and the response body containing a representation of the requested Individual MBS User Data Ingest Session resource within the `MBSUserDataIngestSession` data structure, as specified in clauses 5.27.2.3.3.1.

On failure or if the NEF receives an error code from the MBSF, the NEF shall take proper error handling actions, as specified in clause 5.27.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a `ProblemDetails` data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.29.6.4 Procedure for MBS User Data Ingest Session update/modification

This procedure is used by an AF to request the update/modification of an existing MBS User Data Ingest Session at the NEF.

In order to request the update of an existing MBS User Data Ingest Session, an AF shall send a `Nnef_MBSUserDataIngestSession_Update` request message using the HTTP PUT method and targeting the URI of the corresponding "Individual MBS User Data Ingest Session" resource, with the request body including the `MBSUserDataIngestSession` data structure, as specified in clause 5.27.2.3.3.2.

In order to request the modification of an existing MBS User Data Ingest Session, an AF shall send a `Nnef_MBSUserDataIngestSession_Update` request message using the HTTP PATCH method and targeting the URI of the corresponding "Individual MBS User Data Ingest Session" resource, with the request body including the `MBSUserDataIngestSessionPatch` data structure, as specified in clause 5.27.2.3.3.3.

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized, the NEF shall then trigger the Nmbfsf_MBSUserDataIngestSession service API of the MBSF to request the update/modification of the corresponding MBS User Data Ingest Session at the MBSF, as specified in 3GPP TS 29.580 [66].

Upon reception of a successful response from the MBSF, as defined in 3GPP TS 29.580 [66], the NEF shall return a Nnef_MBSUserDataIngestSession_Update response message with an HTTP "200 OK" status code with the response body containing a representation of the updated Individual MBS User Data Ingest Session resource within the MBSUserDataIngestSession data structure, or an HTTP "204 No Content" status code, as specified in clause 5.27.2.3.3.2 or clause 5.27.2.3.3.3.

On failure or if the NEF receives an error code from the MBSF, the NEF shall take proper error handling actions, as specified in clause 5.27.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a ProblemDetails data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.29.6.5 Procedure for MBS User Data Ingest Session deletion

This procedure is used by an AF to request the deletion of an existing MBS User Data Ingest Session at the NEF.

In order to request the deletion of an existing MBS User Data Ingest Session, an AF shall send a Nnef_MBSUserDataIngestSession_Delete request message using the HTTP DELETE method and targeting the URI of the concerned "Individual MBS User Data Ingest Session" resource, as specified in clause 5.27.2.3.3.4.

NOTE: The Nnef_MBSUserDataIngestSession_Delete service operation corresponds to the stage 2 Nnef_MBSUserDataIngestSession_Destroy service operation defined in 3GPP TS 26.502 [65].

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized, the NEF shall then trigger the Nmbfsf_MBSUserDataIngestSession service API of the MBSF to request the deletion of the corresponding MBS User Data Ingest Session at the MBSF, as specified in 3GPP TS 29.580 [66].

Upon reception of a successful response from the MBSF, as defined in 3GPP TS 29.580 [66], the NEF shall return a Nnef_MBSUserDataIngestSession_Delete response message with an HTTP "204 No Content" status code, as specified in clause 5.27.2.3.3.4.

On failure or if the NEF receives an error code from the MBSF, the NEF shall take proper error handling actions, as specified in clause 5.27.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a ProblemDetails data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.29.6.6 Procedure for MBS User Data Ingest Session Status Subscription

This procedure is used by an AF to subscribe to MBS User Data Ingest Session status event(s) reporting at the NEF.

In order to request the creation of an MBS User Data Ingest Session Status Subscription, an AF shall send a Nnef_MBSUserDataIngestSession_StatusSubscribe request message to the NEF using the HTTP POST method and targeting the "MBS User Data Ingest Session Status Subscriptions" collection resource, with the request message body including the MBSUserDataIngestStatSubsc data structure, as specified in clause 5.27.2.4.3.2.

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized, the NEF shall then trigger the Nmbfsf_MBSUserDataIngestSession API of the MBSF to request the creation of the corresponding MBS User Data Ingest Session Status Subscription at the MBSF, as specified in 3GPP TS 29.580 [66].

Upon reception of a successful response from the MBSF, as defined in 3GPP TS 29.580 [66], the NEF shall return a Nnef_MBSUserDataIngestSession_StatusSubscribe response message with an HTTP "201 Created" status code including a "Location" header field that shall contain the URI of the created resource, and the response body containing a representation of the created "Individual MBS User Data Ingest Session Status Subscription" resource within the MBSUserDataIngestStatSubsc data structure, as specified in clause 5.27.2.4.3.2.

On failure or if the NEF receives an error response from the MBSF, the NEF shall take proper error handling actions, as specified in clause 5.27.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a ProblemDetails data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.29.6.7 Procedure for MBS User Data Ingest Session Status update/modification

This procedure is used by an AF to request the update/modification of an existing MBS User Data Ingest Session Status Subscription at the NEF.

In order to request the update of an existing MBS User Data Ingest Session Status Subscription, an AF shall send a Nnef_MBSUserDataIngestSession_StatusSubscribeMod request message using the HTTP PUT method and targeting the URI of the corresponding "Individual MBS User Data Ingest Session Status Subscription" resource, with the request body including the MBSUserDataIngStatSubsc data structure, as specified in clause 5.27.2.5.3.2.

In order to request the modification of an existing MBS User Data Ingest Session Status Subscription, an AF shall send a Nnef_MBSUserDataIngestSession_StatusSubscribeMod request message using the HTTP PATCH method and targeting the URI of the corresponding "Individual MBS User Data Ingest Session Status Subscription" resource, with the request body including the MBSUserDataIngStatSubscPatch data structure, as specified in clause 5.27.2.5.3.3.

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized, the NEF shall then trigger the Nmbsf_MBSUserDataIngestSession service API of the MBSF to request the update/modification of the corresponding MBS User Data Ingest Session Status Subscription at the MBSF, as specified in 3GPP TS 29.580 [66].

Upon reception of a successful response from the MBSF, as defined in 3GPP TS 29.580 [66], the NEF shall return a Nnef_MBSUserDataIngestSession_StatusSubscribeMod response message with an HTTP "200 OK" status code with the response body containing a representation of the updated Individual MBS User Data Ingest Session resource within the MBSUserDataIngStatSubsc data structure, or an HTTP "204 No Content" status code, as specified in clause 5.27.2.5.3.2 or clause 5.27.2.5.3.3.

On failure or if the NEF receives an error code from the MBSF, the NEF shall take proper error handling actions, as specified in clause 5.27.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a ProblemDetails data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.29.6.8 Procedure for MBS User Data Ingest Session Status Unsubscription

This procedure is used by an AF to request the deletion of an existing MBS User Data Ingest Session Status Subscription at the NEF.

In order to request the deletion of an existing MBS User Data Ingest Session Status Subscription, an AF shall send a Nnef_MBSUserDataIngestSession_StatusUnsubscribe request message using the HTTP DELETE method and targeting the URI of the concerned Individual MBS User Data Ingest Session Status Subscription resource, as specified in clause 5.27.2.5.3.4.

The NEF shall then check whether the AF is authorized to perform this operation or not. If the AF is authorized, the NEF shall then trigger the Nmbsf_MBSUserDataIngestSession service API of the MBSF to request the deletion of the corresponding MBS User Data Ingest Session Status Subscription at the MBSF, as specified in 3GPP TS 29.580 [66].

Upon reception of a successful response from the MBSF, as defined in 3GPP TS 29.580 [66], the NEF shall return a Nnef_MBSUserDataIngestSession_StatusUnsubscribe response message with an HTTP "204 No Content" status code, as specified in clause 5.27.2.5.3.4.

On failure or if the NEF receives an error code from the MBSF, the NEF shall take proper error handling actions, as specified in clause 5.27.7, and respond to the AF with an appropriate error status code. If the NEF received within an error response a ProblemDetails data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.29.6.9 Procedure for MBS User Data Ingest Session Status Notification

This procedure is used by the NEF to send MBS User Data Ingest Session status change notifications to a previously subscribed AF.

Upon reception of an MBS User Data Ingest Session Status Notification from the MBSF, as specified in 3GPP TS 29.580 [66], the NEF shall relay this notification to the AF by sending a Nnef_MBSUserDataIngestSession_StatusNotify request message to the AF using the HTTP POST method and targeting the notification URI provided by the AF during the creation of the corresponding MBS User Data Ingest

Session Status Subscription, with the request body including the MBSUserDataIngStatNotif data structure, as specified in clause 5.27.4.2.3.1.

Upon successful reception of this notification request, the AF shall acknowledge its successful reception by sending a Nnef_MBSUserDataIngestSession_StatusNotify response message with an HTTP "204 No Content" status code, as specified in clause 5.27.4.2.3.1.

On failure, the AF shall take proper error handling actions, as specified in subclause 5.27.7, and respond to the NEF with an appropriate error status code.

4.4.30 Procedures for Data Reporting

4.4.30.1 General

The procedures in this clause are used by an AF to obtain data collection and reporting information and provide Data Reports, as defined in clause 4.2 of 3GPP TS 26.531 [59] and 3GPP TS 26.532 [60].

4.4.30.2 Procedure for Data Reporting Session Management

This procedure is used by an AF to request the creation/update/deletion of a Data Reporting Session in order to obtain data collection and reporting information.

In order to request the creation of a Data Reporting Session, an AF shall send a Nnef_DataReporting_Create request to the NEF using the HTTP POST method, targeting the "Data Reporting Sessions" collection resource with the request message body including the DataReportingSession data structure as defined in clause 5.23.2.2.3.1.

In order to read an existing Individual Data Reporting Session, an AF shall send a Nnef_DataReporting_Retrieve request to the NEF using the HTTP GET method, targeting the concerned "Individual Data Reporting Session" resource. If successful, the response message body contains the requested DataReportingSession data structure as defined in clause 5.23.2.3.3.1.

In order to request the update of an existing Data Reporting Session, an AF shall send a Nnef_DataReporting_Update request to the NEF using the HTTP PUT method, targeting the concerned "Individual Data Reporting Session" resource with the request message body including the updated resource representation within the DataReportingSession data structure as defined in clause 5.23.2.3.3.2.

In order to request the deletion of an existing Data Reporting Session, an AF shall send a Nnef_DataReporting_Delete request to the NEF using the HTTP DELETE method, targeting the concerned "Individual Data Reporting Session" resource as defined in clause 5.23.2.3.3.3.

At the reception of the HTTP POST GET/PUT/DELETE requests from the AF, the NEF shall trigger the necessary interaction with the DCAF as specified in 3GPP TS 26.532 [60] and:

- for an HTTP GET request, retrieve the requested "Individual Data Reporting Session" resource and respond to the AF with an HTTP "200 OK" status code;
- for an HTTP POST request, create a new "Individual Data Reporting Session" resource and respond to the AF with an HTTP "200 OK" status code including an HTTP Location header field containing the URI of the created resource and the response body including a representation of the created "Individual Data Reporting Session" resource within the DataReportingSession data structure;
- for an HTTP PUT request, update the concerned "Individual Data Reporting Session" resource and respond to the AF with an HTTP "200 OK" status code with the response body including a representation of the updated "Individual Data Reporting Session" resource within the DataReportingSession data structure; and
- for an HTTP DELETE request, delete the corresponding "Individual Data Reporting Session" resource, and respond to the AF with an HTTP "204 No Content" status code.

4.4.30.3 Procedure for Data Report

This procedure is used by an AF to send collected UE Data Reports to the NEF.

In order to send a collected UE Data Report, an AF shall use the "Report" custom operation. The AF shall send for this purpose an HTTP POST request targeting the URI "{apiRoot}/3gpp-data-reporting/v1/sessions/{sessionId}/report", with the request message body including the DataReport data structure specified in 3GPP TS 26.532 [60]. Upon successful reception of the report, the NEF shall respond to the AF with an HTTP "200 OK" status code.

4.4.31 Procedures for Data Reporting Provisioning

4.4.31.1 General

The procedures in this clause are used by an AF to supply data collection and reporting provisioning information in the form of Data Reporting Provisioning resources, as defined in clause 4.2 of 3GPP TS 26.531 [59] and 3GPP TS 26.532 [60].

4.4.31.2 Procedure for Data Reporting Provisioning Session Management

This procedure is used by an AF to request the creation/deletion of a Data Reporting Provisioning Session in order to supply data collection and reporting provisioning information.

In order to request the creation of a Data Reporting Provisioning Session, an AF shall send a Nnef_DataReportingProvisioning_Create request to the NEF using the HTTP POST method and targeting the "Data Reporting Provisioning Sessions" collection resource, with the request message body including the DataReportingProvisioningSession data structure as defined in clause 5.24.2.2.3.1.

In order to read an existing "Individual Data Reporting Provisioning Session" resource, an AF shall send a Nnef_DataReportingProvisioning_Retrieve request to the NEF using the HTTP GET method and targeting the concerned "Individual Data Reporting Provisioning Session" resource, as defined in clause 5.24.2.3.3.1.

In order to request the deletion of an existing Data Reporting Provisioning Session, an AF shall send a Nnef_DataReportingProvisioning_Delete request to the NEF using the HTTP DELETE method and targeting the concerned "Individual Data Reporting Provisioning Session" resource as defined in clause 5.24.2.3.3.3.

At the reception of the HTTP POST/GET/DELETE request from the AF, the NEF shall trigger the necessary interactions with the DCAF as specified in 3GPP TS 26.532 [60] and:

- for an HTTP POST request, create a new "Individual Data Reporting Provisioning Session" resource and respond to the AF with an HTTP "200 OK" status code including an HTTP Location header field containing the URI of the created resource and the response body including a representation of the created "Individual Data Reporting Provisioning Session" resource within the DataReportingProvisioningSession data structure;
- for an HTTP GET request, respond to the AF with an HTTP "200 OK" status code with the response body including the representation of the requested "Individual Data Reporting Provisioning Session" resource within the DataReportingProvisioningSession data structure; and
- for an HTTP DELETE request, delete the corresponding "Individual Data Reporting Provisioning Session" resource and respond to the AF with an HTTP "204 No Content" status code.

4.4.31.3 Procedure for Data Reporting Configuration management

This procedure is used by an AF to manage Data Reporting Configuration.

In order to request the creation of a Data Reporting Configuration, an AF shall send a Nnef_DataReportingProvisioning_CreateConfiguration request to the NEF using the HTTP POST method and targeting the "Data Reporting Configurations" collection resource, with the request message body including the DataReportingConfiguration data structure as defined in clause 5.24.2.5.3.1.

In order to read an existing Data Reporting Configuration, an AF shall send a Nnef_DataReportingProvisioning_RetrieveConfiguration request to the NEF using the HTTP GET method and targeting the concerned "Individual Data Reporting Configuration" resource, as defined in clause 5.24.2.4.3.1.

In order to request the update of an existing Data Reporting Configuration, an AF shall send a Nnef_DataReportingProvisioning_UpdateConfiguration request to the NEF using the HTTP PUT method, targeting the

concerned "Individual Data Reporting Configuration" resource with the request message body including the updated resource representation within the DataReportingConfiguration data structure as defined in clause 5.24.2.5.3.3.

In order to request the modification of an existing Data Reporting Configuration, an AF shall send a Nnef_DataReportingProvisioning_UpdateConfiguration request to the NEF using the HTTP PATCH method and targeting the concerned "Individual Data Reporting Configuration" resource with the request message body containing the DataReportingConfigurationPatch data structure, as defined in clause 5.24.2.5.3.3A.

In order to request the deletion of an existing Data Reporting Configuration, an AF shall send a Nnef_DataReportingProvisioning_DeleteConfiguration request to the NEF using the HTTP DELETE method and targeting the concerned "Individual Data Reporting Configuration" resource as defined in clause 5.24.2.5.3.4.

At the reception of the HTTP POST/GET/PUT/PATCH/DELETE requests from the AF, the NEF shall trigger the necessary interactions with the DCAF as specified in 3GPP TS 26.532 [60] and:

- for an HTTP POST request, create a new "Individual Data Reporting Configuration" resource and respond to the AF with an HTTP "200 OK" status code including an HTTP Location header field containing the URI of the created resource and the response body including a representation of the created "Data Reporting Configuration" resource within the DataReportingConfiguration data structure;
- for an HTTP GET request, respond to the AF with an HTTP "200 OK" status code with the response body including the representation of the requested "Individual Data Reporting Configuration" resource within the DataReportingConfiguration data structure;
- for an HTTP PUT/PATCH request, update/modify the concerned "Individual Data Reporting Configuration" resource and respond to the AF with an HTTP "200 OK" status code with the response body including a representation of the updated/modified "Individual Data Reporting Configuration" resource within the DataReportingConfiguration data structure, or with an HTTP "204 No Content" status code; and
- for an HTTP DELETE request, delete the corresponding "Individual Data Reporting Configuration" resource and respond to the AF with an HTTP "204 No Content" status code.

4.4.32 Procedures for AF specific UE ID retrieval

4.4.32.1 General

The procedures described in the clauses below are used by an AF to request the NEF to provide an AF specific UE ID, as described in clause 4.15.10 of 3GPP TS 23.502 [2].

4.4.32.2 Retrieve AF specific UE ID service operation

In order to retrieve AF specific UE ID information, the AF shall send an HTTP POST request message to the NEF targeting the resource URI "{apiRoot}/3gpp-ueid/v1/retrieve", with the request body including the UeIdReq data structure.

Upon reception of the HTTP POST request message from the AF, the NEF shall check whether the AF is authorized to perform this operation or not:

- if AF is not authorized, the NEF shall respond to the AF with a "403 Forbidden" status code with the response body including the ProblemDetails data structure containing the "cause" attribute set to the "REQUEST_NOT_AUTHORIZED" application error indicating the AF authorisation failure; and
- if the AF's request is authorized, then if the DNN and/or S-NSSAI information is not available in the request, the NEF shall determine the corresponding DNN and/or S-NSSAI information based on the requesting AF Identifier, and if provided, the MTC Provider Information.

The NEF shall then interact with the BSF using the UE address and IP domain (if the UE IPv4 address is provided), DNN and/or S-NSSAI to retrieve the session binding information of the UE by invoking the Nbsf_Management_Discovery service operation, as described in 3GPP TS 29.521 [9].

If the NEF receives an error response from the BSF, the NEF shall respond to the AF with a proper error status code. If the NEF received from the BSF an error response including a "ProblemDetails" data structure with the "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error.

If no SUPI matching the provided UE information is returned by the BSF, the NEF shall respond to the AF with a "404 Not Found" status code with the response body including a ProblemDetails data structure containing the "cause" attribute set to the "UE_NOT_FOUND" application error to indicate that the requested UE address is not found.

Upon success and a SUPI is returned by the BSF, the NEF shall then interact with UDM to retrieve the AF specific UE Identifier using the received SUPI and at least one of the Application Port ID, MTC Provider Information or AF Identifier information by invoking Nudm_SDM_Get service, as described in clause 5.2.2.2 of 3GPP TS 29.503 [17]. Upon success, the UDM responds to the NEF with the AF specific UE Identifier represented as an External Identifier for the UE which is uniquely associated with the Application Port ID, MTC provider Information and/or AF Identifier. The NEF shall then respond to the AF with the received information, i.e. the AF specific UE Identifier represented as an External Identifier that was received from the UDM.

If the NEF receives an error response from the UDM, the NEF shall respond to the AF with a proper error status code. If the NEF received from the UDM an error response including a "ProblemDetails" data structure with the "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error. If the UDM indicates that the requested UE Identifier is not available in the subscription data, the NEF shall respond to the AF with a "404 Not Found" error status code with the response body including a ProblemDetails data structure containing the "cause" attribute set to the "UE_ID_NOT_AVAILABLE" application error to indicate that the AF specific UE ID is not available.

NOTE: The case where UE's IP address provided by the AF to the NEF corresponds to an IP address that has been NATed (Network and Port Address Translation) is not supported in this release of the specification.

4.4.33 Procedures for Media Streaming Event Exposure

4.4.33.1 General

The procedures described in the clauses below are used by an external/untrusted event consumer AF to subscribe, update and delete a subscription to Media Streaming Exposure event(s) reporting via the NEF, also for a data collection AF to notify the observed Media Streaming event(s) which has been subscribed, as defined in 3GPP TS 26.512 [67].

4.4.33.2 Procedure for Media Streaming Event Exposure Subscription Creation

This procedure is used by an event consumer AF to subscribe to at least one Media Streaming Exposure event at the NEF.

In order to subscribe to at least one Media Streaming Exposure event, an event consumer AF shall send a Nnef_MSEventExposure_Subscribe request message to the NEF using the HTTP POST method and targeting the "Media Streaming Event Exposure Subscriptions" collection resource, with the request message body including the AfEventExposureSubsc data structure, as specified in clause 5.28.2.2.3.2.

The NEF shall then check whether the event consumer AF is authorized to perform this operation or not. If the event consumer AF is authorized, the NEF shall then trigger the Naf_EventExposure API of the data collection AF to request the creation of the corresponding Application Event Subscriptions at the AF, as specified in 3GPP TS 29.517 [58].

Upon reception of a successful response from the data collection AF, as defined in 3GPP TS 29.517 [58], the NEF shall return a Nnef_MSEventExposure_Subscribe response message with an HTTP "201 Created" status code including a "Location" header field that shall contain the URI of the created resource, i.e. "{apiRoot}/3gpp-ms-event-exposure/v1/subscriptions/{subscriptionId}", and the response body containing a representation of the created "Individual Media Streaming Event Exposure Subscription" resource within the AfEventExposureSubsc data structure, as specified in clause 5.28.2.2.3.2.

On failure or if the NEF receives an error response from the data collection AF, the NEF shall take proper error handling actions, as specified in clause 5.28.7, and respond to the event consumer AF with an appropriate error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.33.3 Procedure for Media Streaming Event Exposure Subscription Update

This procedure is used by an event consumer AF to update an existing Media Streaming Event Exposure Subscription at the NEF.

In order to update an existing Media Streaming Event Exposure Subscription, the event consumer AF shall send a Nnef_MSEventExposure_Subscribe request message to the NEF using the HTTP PUT method and targeting the "Individual Media Streaming Event Exposure Subscription" resource, with the request message body including the AfEventExposureSubsc data structure, as specified in clause 5.28.2.3.3.2.

The NEF shall then check whether the event consumer AF is authorized to perform this operation or not. If the event consumer AF is authorized, the NEF shall then trigger the Naf_EventExposure API of the data collection AF to request the update of the corresponding Individual Application Event Subscription at the AF, as specified in 3GPP TS 29.517 [58].

Upon reception of a successful response from the data collection AF, as defined in 3GPP TS 29.517 [58], the NEF shall return a Nnef_MSEventExposure_Subscribe response message with an HTTP "200 OK" status code with the AfEventExposureSubsc data structure or "204 No Content" status code, as specified in clause 5.28.2.3.3.2.

On failure or if the NEF receives an error response from the data collection AF, the NEF shall take proper error handling actions, as specified in clause 5.28.7, and respond to the event consumer AF with an appropriate error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.33.4 Procedure for Media Streaming Event Exposure Unsubscription

This procedure is used by an event consumer AF to request the deletion of an existing Media Streaming Event Exposure Subscription at the NEF.

In order to request the deletion of an existing Media Streaming Event Exposure Subscription, an event consumer AF shall send a Nnef_MSEventExposure_Unsubscribe request message using the HTTP DELETE method and targeting the URI of the concerned "Individual Media Streaming Event Exposure Subscription" resource.

The NEF shall then check whether the event consumer AF is authorized to perform this operation or not. If the AF is authorized, the NEF shall then trigger the Naf_EventExposure service API of the data collection AF to request the deletion of the corresponding Application Event Subscription at the AF, as specified in 3GPP TS 29.517 [58].

Upon reception of a successful response from the data collection AF, as defined in 3GPP TS 29.517 [58], the NEF shall return a Nnef_MSEventExposure_Unsubscribe response message with an HTTP "204 No Content" status code.

On failure or if the NEF receives an error code from the data collection AF, the NEF shall take proper error handling actions, as specified in clause 5.28.7, and respond to the event consumer AF with an appropriate error status code. If the NEF received within an error response a "ProblemDetails" data structure with a "cause" attribute indicating an application error, the NEF shall relay this error response to the AF with a corresponding application error, when applicable.

4.4.33.5 Procedure for Media Streaming Event Exposure Notification

This procedure is used by the NEF to send a Media Streaming Event Exposure notification to a previously subscribed event consumer AF.

In order to send a Media Streaming Event Exposure notification, the NEF shall send a Nnef_MSEventExposure_Notify request message to the AF using the HTTP POST method and targeting the notification URI provided during the creation/update of the corresponding subscription, with the request body including the MSEventExposureNotif data structure as specified in clause 5.28.4.2.3.1.

Upon success, the event consumer AF shall send a Nnef_MSEventExposure_Notify response message with an HTTP "204 No Content" status code.

On failure, the event consumer AF shall take proper error handling actions, as specified in subclause 5.28.7, and respond to the NEF with an appropriate error status code.

5 NEF Northbound APIs

5.1 Introduction

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

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

Table 5.1-1: API Descriptions

| Service Name | Clause 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 |
| ASTI | 5.22 | ASTI API | TS29522_ASTI.yaml | 3gpp-asti | A.20 |
| DataReporting | 5.23 | DataReporting API | TS29522_DataReporting.yaml | 3gpp-data-reporting | A.21 |
| DataReportingProvisioning | 5.24 | DataReportingProvisioning API | TS29522_DataReportingProvisioning.yaml | 3gpp-data-reporting-provisioning | A.22 |
| UEId | 5.25 | UE ID API | TS29522_UEId.yaml | 3gpp-ueid | A.23 |
| MBSUserService | 5.26 | MBSUserService API | TS29522_MBSUserService.yaml | 3gpp-mb-us | A.24 |
| MBSUserDataIngestSession | 5.27 | MBSUserDataIngestSession API | TS29522_MBSUserDataIngestSession.yaml | 3gpp-mb-ud-ingest | A.25 |
| MSEventExposure | 5.28 | MSEventExposure API | TS29522_MSEventExposure.yaml | 3gpp-event-exposure | A.26 |

5.2 Information applicable to several APIs

The usage of HTTP, content type and URI structure definition, as specified in clauses 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 clauses 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 clause 5.2.9 of 3GPP TS 29.122 [4] shall be applicable for NEF Northbound APIs.

5.3 Reused APIs

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

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

| API Name | Differences |
|---------------------------|--|
| ResourceManagementOfBdt | - The following features as described in clause 5.4.4 of 3GPP TS 29.122 [4] may only be supported in 5G: "LocBdt_5G", "Group_Id", "BdtNotification_5G". |
| PfdManagement | The following features as described in clause 5.11.4 of 3GPP TS 29.122 [4] may only be supported in 5G: "FailureLocation_5G". |
| MonitoringEvent | - The following features as described in clause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G: "Number_of_UEs_in_an_area_notification_5G", "Downlink_data_delivery_status_5G", "Availability_after_DDN_failure_notification_enhancement", "eLCS", "NSAC", "MULTIQOS", "EDGEAPP", "UEId_retrieval". - 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. |
| DeviceTriggering | |
| CpProvisioning | - The following features as described in clause 5.10.4 of 3GPP TS 29.122 [4] may only be supported in 5G: "ExpectedUMT_5G", "ExpectedUmtTime_5G", "ScheduledCommType_5G", "UEId_retrieval". |
| ChargeableParty | - The following features as described in clause 5.5.4 of 3GPP TS 29.122 [4] may only be supported in 5G: "EthChgParty_5G", "MacAddressRange_5G". - The events (i.e. LOSS_OF_BEARER, RECOVERY_OF_BEARER and RELEASE_OF_BEARER) do not apply for 5G. |
| AsSessionWithQoS | - The following features as described in clause 5.14.4 of 3GPP TS 29.122 [4] may only be supported in 5G: "EthAsSessionQoS_5G", "QoSMonitoring_5G", "PacketDelayFailureReport", "MacAddressRange_5G", "AlternativeQoS_5G", "TSC_5G", "DisableUENotification_5G", "ExposureToEAS", "AltQoSWithIndParams_5G", "EnEthAsSessionQoS_5G", "enNB_5G". - The events (i.e. LOSS_OF_BEARER, RECOVERY_OF_BEARER and RELEASE_OF_BEARER) do not apply for 5G. |
| MsisdnLessMoSms | |
| NpConfiguration | - The following features as described in clause 5.13.4 of 3GPP TS 29.122 [4] may only be supported in 5G: "NpExpiry_5G", "UEId_retrieval". |
| NIDD | |
| RacsParameterProvisioning | |
| ECRControl | - The following features as described in clause 5.12.4 of 3GPP TS 29.122 [4] may only be supported in 5G: "ECR_WB_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 clause 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 clauses below are defined relative to the above root URI.

This clause 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.

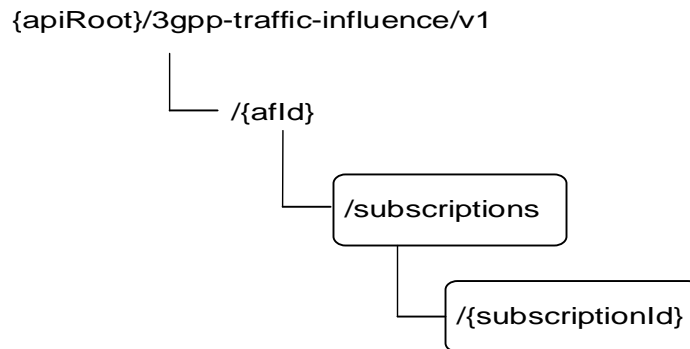


Figure 5.4.1.1-1: Resource URI structure of the TrafficInfluence API

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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 5.2.5 of 3GPP TS 29.122 [4].

Table 5.4.2.1-1: Notifications overview

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

5.4.2.2 Event Notification

5.4.2.2.1 Description

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

5.4.2.2.2 Target URI

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

Table 5.4.2.2.2-1: 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 or the TrafficInfluSubPatch data type as defined in table 5.4.3.3.3-1. |

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 clause 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 clause 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. |

5.4.2.3.2 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 clause 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 clause 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 clause 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 clause 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. |
| ReportingInformation | 3GPP TS 29.523 [22] | Represents the event reporting requirements. |
| 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. |
| UIntegerRm | 3GPP TS 29.571 [8] | 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. | |
| afAppId | 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 clause 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_w ebssocket |
| 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 "externalGroupId" attribute was included within the TrafficInfluSub data type previously. It is used to indicate that for the group of UEs, the targeted PDU sessions should be correlated by a common DNAI. Set to "true" if it should be correlated; otherwise set to "false". Default value is "false" if omitted. (NOTE 4) | |
| 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 |
| eventReq | ReportingInformation | O | 0..1 | Indicates the event reporting requirements. This attribute may be provided if the "EDGEAPP" feature is supported and the "subscribedEvents" attribute is present. | EDGEAPP |
| eventReports | array(EventNotification) | C | 1..N | Represents user plane path management event report(s). This attribute shall be present in an HTTP POST response if the immediate reporting indication in the "immRep" attribute within the "eventReq" attribute is set to true and the "subscribedEvents" was present in the corresponding HTTP POST request and the report(s) are available. This attribute may also be present in an HTTP PUT or PATCH response when the report(s) are available. | EDGEAPP |
| suppFeat | SupportedFeatures | C | 0..1 | Indicates the list of Supported features used as described in clause 5.4.4. This attribute shall be provided in the POST request and in the response of successful resource creation. | |

| | |
|---------|---|
| NOTE 1: | Properties marked with a feature as defined in clause 5.4.4 are applicable as described in clause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features. |
| NOTE 2: | One of individual UE identifier (i.e. "gpsi", "macAddr", "ipv4Addr" or "ipv6Addr"), External Group Identifier (i.e. "externalGroupld") or any UE indication "anyUeInd" shall be included. |
| NOTE 3: | One of "afAppld", "trafficFilters" or "ethTrafficFilters" shall be included. |
| NOTE 4: | The indication of traffic correlation shall be provided only when the AF requires that all the PDU sessions related to the 5G VN group member UEs should be correlated by a common DNAI in the user plane for the traffic as described in 3GPP TS 23.501 [3], clause 5.6.7.1 and clause 5.29. |

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) | |
| tfCorrInd | boolean | O | 0..1 | Indication of traffic correlation. May only be included when "externalGroupId" attribute was included within the TrafficInfluSub data type previously. It is used to indicate that for the group of UEs, the targeted PDU sessions should be correlated by a common DNAI. | |
| tempValidities | array(TemporalValidity) | O | 1..N | Indicates the time interval(s) during which the AF request is to be applied. (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. | |

| | | | | | |
|---|----------------------|---|------|--|---------|
| eventReq | ReportingInformation | O | 0..1 | Indicates the event reporting requirements. This attribute may be provided if the "EDGEAPP" feature is supported. | EDGEAPP |
| 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 |
| NOTE 1: Properties marked with a feature as defined in clause 5.4.4 are applicable as described in clause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features. | | | | | |
| NOTE 2: If the DNAI is not changed while the N6 traffic routing information is changed, the "sourceDnai" attribute and "targetDnai" attribute shall not be provided. | | | | | |
| NOTE 3: The change from the UP path status where no DNAI applies to a status where a DNAI applies indicates the activation of the related AF request and therefore only the target DNAI and N6 traffic routing information is provided in the event notification; the change from the UP path status where a DNAI applies to a status where no DNAI applies indicates the de-activation of the related AF request and therefore only the source DNAI and N6 traffic routing information is provided in the event notification. | | | | | |

5.4.3.3.5 Type: AfResultInfo

Table 5.4.3.3.5-1: Definition of type AfResultInfo

| Attribute name | Data type | 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 |
| easIpReplacInfos | 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 clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

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 clause 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. |
| 11 | EDGEAPP | This feature controls the support of EDGE applications related functionalities (e.g. support the provisioning of event reporting requirements). |
| 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. | | |

5.4.5 Error handling

5.4.5.1 General

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

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

5.4.5.2 Protocol Errors

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

5.4.5.3 Application Errors

The application errors defined for TrafficInfluence API are listed in table 5.4.5.3-1.

Table 5.4.5.3-1: Application errors

| Application Error | HTTP status code | Description | Applicability |
|-------------------|------------------|-------------|---------------|
| | | | |

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 clause 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 clause 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 clause 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 5.5.2.3.1-4: 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. |

5.5.2.3.2 Notification via Websocket

Not specified in the present specification.

5.5.3 Data Model

5.5.3.1 General

This clause 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) |
|---|-------------------|---|-------------|---|----------------------|
| aflid | string | M | 1 | Identifies the trigger receiving entity. | |
| neflid | 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 clause 5.5.4. | |
| NOTE: Properties marked with a feature as defined in clause 5.5.4 are applicable as described in clause 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 5.5.3.3.3-1: 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 clause 5.5.4. | |
| NOTE: Properties marked with a feature as defined in clause 5.5.4 are applicable as described in clause 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 clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

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 clause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.5.4-1: Features used by NiddConfigurationTrigger API

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

5.5.5 Error handling

5.5.5.1 General

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

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

5.5.5.2 Protocol Errors

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

5.5.5.3 Application Errors

The application errors defined for NiddConfigurationTrigger API are listed in table 5.5.5.3-1.

Table 5.5.5.3-1: Application errors

| Application Error | HTTP status code | Description | Applicability |
|-------------------|------------------|-------------|---------------|
| | | | |

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 clause 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 clauses below are defined relative to the above root URI.

This clause 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.

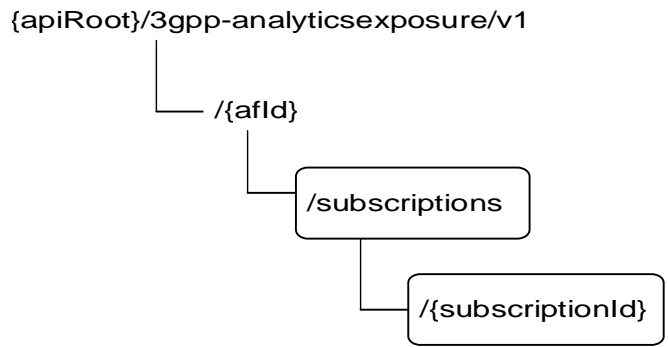


Figure 5.6.1.1-1: Resource URI structure of the AnalyticsExposure API

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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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. |
| ProblemDetails | O | 0..1 | 400 Bad Request | (NOTE 2) |
| 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 clause 5.6.5. | | | | |

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/{afld}/subscriptions/{subscriptionId} |

5.6.1.3 Resource: Individual Analytics Exposure Subscription

5.6.1.3.1 Introduction

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

5.6.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-analyticsexposure/v1/{afld}/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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| ProblemDetails | O | 0..1 | 400 Bad Request | (NOTE 2) |
| ProblemDetails | O | 0..1 | 500 Internal Server Error | (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 clause 5.6.5. | | | | |

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 clause 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 clause 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 clause 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| ProblemDetails | O | 0..1 | 400 Bad Request | (NOTE 2) |
| ProblemDetails | O | 0..1 | 500 Internal Server Error | (NOTE 2) |
| ProblemDetailsAnalyticsInfoRequest | O | 0..1 | 500 Internal Server Error | The request is rejected by the NEF and more details (not only the ProblemDetails) may be returned. (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 clause 5.6.5. | | | | |

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 clause 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/modification 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 clause 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 clause 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 clause 5.2.5.4 of 3GPP TS 29.122 [4].

5.6.3 Data Model

5.6.3.1 General

This clause 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 |
| QoSSustainabilityExposure | 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] | |
| AddrFqdn | 3GPP TS 29.517 [58] | |
| 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] | |
| BwRequirement | 3GPP TS 29.520 [27] | |
| 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. |
| Dnai | 3GPP TS 29.571 [8] | Identifies a user plane access to one or more DN(s). |
| Dnn | 3GPP TS 29.571 [8] | |
| DnPerfInfo | 3GPP TS 29.520 [27] | DN Performance information. |
| DnPerformanceReq | 3GPP TS 29.520 [27] | DN Performance requirement. |
| 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. |
| MatchingDirection | 3GPP TS 29.520 [27] | Matching direction |
| NetworkPerfRequirement | 3GPP TS 29.520 [27] | |
| NsIdInfo | 3GPP TS 29.520 [27] | |
| NwdafFailureCode | 3GPP TS 29.520 [27] | Identifies the analytics failure reason. |
| ProblemDetailsAnalyticsInfoRequest | 3GPP TS 29.520 [27] | |
| QosRequirement | 3GPP TS 29.520 [27] | |
| RatFreqInformation | 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] | |
| ServiceExperienceInfo | 3GPP TS 29.520 [27] | |
| 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] | |
| TopApplication | 3GPP TS 29.520 [27] | Top application that contributes the most to the traffic. |
| 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 1) |
|---|----------------------------------|---|-------------|---|-------------------------|
| analyEventsSubs | array(AnalyticsEventSubsc) | M | 1..N | Subscribed analytics events. | |
| analyReplInfo | ReportingInformation | O | 0..1 | Reporting requirement information of the subscription. If omitted, the default values within the ReportingInformation data type apply. (NOTE 2) | |
| 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 "analyReplInfo" 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 clause 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 clause 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 1: Properties marked with a feature as defined in clause 5.6.4 are applicable as described in clause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property applies for all the features. | | | | | |
| NOTE 2: The attributes "partitionCriteria" and "notifFlag" of the data type ReportingInformation are applicable only if the "EneNA" feature is supported. | | | | | |

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. (NOTE 2) | |
| timeStamp | DateTime | M | 1 | Time at which the event is observed. | |
| failNotifyCode | AnalyticsFailureCode | C | 0..1 | Identifies the failure reason for the event notification. It shall only be included if the event notification is failed or the analytics information is not ready. (NOTE 1) | EneNA |
| rvWaitTime | DurationSec | O | 0..1 | Indicates a recommended time interval (in seconds) which is used to determine the time when analytics information is needed in similar future event subscriptions. It may only be included if the "failNotifyCode" attribute sets to "UNSATISFIED_REQUESTED_ANALYTICS_TIME". | EneNA |
| 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 |
| 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(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 | Contains the network performance information. Shall be present if the "analyEvent" attribute is set to "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 |
| dnPerfInfos | array(DnPerfInfo) | C | 1..N | Contains the DN performance information. Shall be present if the "analyEvent" attribute is set to "DN_PERFORMANCE". | DnPerformance |

| | | | | | |
|--|------------------------------|---|------|--|-------------------|
| svcExps | array(ServiceExperienceInfo) | C | 1..N | Contains the service experience information. Shall be present if the "analyEvent" attribute is set to "SERVICE_EXPERIENCE". | ServiceExperience |
| timeStampGen | DateTime | O | 0..1 | It defines the timestamp of analytics generation. | EneNA |
| start | DateTime | O | 0..1 | It defines the start time of which the analytics information will become valid. (NOTE 2) | EneNA |
| NOTE 1: The values of "UNAVAILABLE_DATA" and "BOTH_STAT_PRED_NOT_ALLOWED" of the AnalyticsFailureCode data type are not applicable for the "failNotifyCode" attribute. | | | | | |
| NOTE 2: If the "start" attribute and the "expiry" attribute are both provided, the DateTime of the "expiry" attribute shall not be earlier than the DateTime of the "start" attribute. | | | | | |

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 DnPerformance ServiceExperience |
| dnn | Dnn | O | 0..1 | Identifies the DNN. (NOTE 7) | Ue_Communication Abnormal_Behavior ServiceExperience DnPerformance |
| dnais | array(Dnai) | O | 1..N | Identification(s) of user plane access to DN(s) which the subscription applies. | DnPerformance ServiceExperience |
| applds | array(ApplicationId) | O | 1..N | Each element identifies an application. (NOTE 7) | Abnormal_Behavior Ue_Communication Dispersion DnPerformance ServiceExperience |
| excepRequs | 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 |
| matchingDir | MatchingDirection | O | 0..1 | A matching direction may be provided alongside a threshold. If omitted, the default value is CROSSED. | QoS_Sustainability Congestion, Network_Performance |
| reptThlds | array(ThresholdLevel) | O | 1..N | Represents the 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 |
| snsai | Snsai | O | 0..1 | Identifies the network slice information. (NOTE 7) | Ue_Communication QoS_Sustainability Abnormal_Behavior Congestion Dispersion ServiceExperience DnPerformance |
| nsildInfos | array(NsildInfo) | O | 1..N | Each element identifies the S-NSSAI and the optionally associated network slice instance(s). May be included when subscribed event is "SERVICE_EXPERIENCE" or "DN_PERFORMANCE". | ServiceExperience DnPerformance |
| 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(Dispersion Requirement) | O | 1..N | Represents the dispersion analytics requirements. | Dispersion |
| dnPerfReqs | array(DnPerformanceReq) | O | 1..N | Represents the DN performance analytics requirements. | DnPerformance |
| bwRequs | array(BwRequirement) | O | 1..N | Represents the bandwidth requirement for each application. | ServiceExperience |
| ratFreqs | array(RatFreqInformation) | O | 1..N | Identification(s) of the RAT type and/or frequencies of UE's serving cell(s) which the subscription applies. (NOTE 8) | ServiceExperience |
| appServerAddrs | array(AddrFqdn) | C | 1..N | Each of the element represents the Application Server Instance (IP address/FQDN of the Application Server) (NOTE 9) | ServiceExperience DnPerformance |
| 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) | |
| maxNumOfTopAppUl | UInteger | O | 0..1 | Indicates the requested maximum number of top applications that contribute the most to the traffic in Uplink direction. Minimum = 1. May be included when one of the element in the "listOfAnaSubsets" attribute is set to LIST_OF_TOP_APP_UL. | CongestionExt |
| maxNumOfTopAppDl | UInteger | O | 0..1 | Indicates the requested maximum number of top applications that contribute the most to the traffic in Downlink direction. Minimum = 1. May be included when one of the element in the "listOfAnaSubsets" attribute is set to LIST_OF_TOP_APP_DL. | CongestionExt |
| visitedLocAreas | array(LocationArea5G) | O | 1..N | Identifications of network areas which the UEs had previously been in at least one of the Visited Area(s) of Interest. (NOTE 10) | Ue_Mobility |

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" or "DN_PERFORMANCE", this attribute shall be provided if "notifMethod" within "analyReplInfo" sets to "ON_EVENT_DETECTION" or omitted.

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

NOTE 6: The "sampRatio" attribute and "histAnaTimePeriod" attribute within EventReportingRequirement data type is not applicable for the present API. The attributes "accPerSubset", "offsetPeriod", and "timeAnaNeeded" within the EventReportingRequirement data type are applicable only if the "EneNA" feature is supported.

NOTE 7: For "ABNORMAL_BEHAVIOR" event with "anyUeInd" 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", "appls", "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.

NOTE 8: If both the "allFreq" attribute and the "allRat" attribute within the "ratFreqs" attribute are present, then the cardinality shall be 1 as the "all" indication for all the RAT type and Frequency value the NWDAF has received for the application.

NOTE 9: This parameter shall be provided when a consumer requires analytics for an edge application over a UP path.

NOTE 10: The NetworkAreaInfo within the "visitedLocAreas" attribute is not applicable for the untrusted AF. If this attribute is provided, the analytics target period shall be a past time period (i.e. only statistics is supported).

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 DnPerformance ServiceExperience |
| gpsi | Gpsi | O | 0..1 | Identifies a GPSI for an UE. | Abnormal_Behavior Congestion Ue_Mobility Ue_Communication Network_Performance Dispersion DnPerformance ServiceExperience |
| 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 DnPerformance ServiceExperience |
| 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. Minimum = 0. Maximum = 100. | |
| NOTE: If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned. | | | | | |

5.6.3.3.11 Void

5.6.3.3.12 Type: AnalyticsRequest

Table 5.6.3.3.12-1: Definition of type AnalyticsRequest

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|--|---------------------------|---|-------------|--|---------------|
| analyEvent | AnalyticsEvent | M | 1 | Identifies the analytics type. | |
| analyEventFilter | AnalyticsEventFilter | C | 0..1 | Shall be included to identify the analytics when filter information is needed for the related event. | |
| analyRep | EventReportingRequirement | O | 0..1 | Identifies the analytics reporting requirement information. (NOTE) | |
| tgtUe | TargetUeId | O | 0..1 | Identifies the target UE information. | |
| suppFeat | SupportedFeatures | M | 1 | Represents the features supported by the NF service consumer. | |
| NOTE: The attributes "accPerSubset", "offsetPeriod", and "timeAnaNeeded" within the EventReportingRequirement data type are applicable only if the "EneNA" feature is supported. | | | | | |

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 DnPerformance ServiceExperience |
| dnn | Dnn | O | 0..1 | Identifies the DNN. (NOTE 3) | Ue_Communication Abnormal_Behavior DnPerformance ServiceExperience |
| dnais | array(Dnai) | O | 1..N | Identification(s) of user plane access to DN(s) which the subscription applies. | DnPerformance ServiceExperience |
| 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 DnPerformance ServiceExperience Dispersion |
| 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 DnPerformance ServiceExperience |
| nsildInfos | array(NsildInfo) | O | 1..N | Each element identifies the S-NSSAI and the optionally associated network slice instance(s). May be included when subscribed event is "SERVICE_EXPERIENCE" or "DN_PERFORMANCE". | ServiceExperience DnPerformance |
| qosReq | QosRequirement | C | 0..1 | Represents the QoS requirements. This attribute shall be included when analyEvent is "QOS_SUSTAINABILITY". | QoS_Sustainability |
| listOfAnaSubsets | array(AnalyticsSubset) | O | 1..N | The list of analytics subsets can be used to indicate the content of the analytics. | EneNA |
| dnPerfReqs | array(DnPerformanceReq) | O | 1..N | Represents the DN performance analytics requirements. | DnPerformance |
| bwReqs | array(BwRequirement) | O | 1..N | Represents the media/application bandwidth requirement for each application. It may only be present if "applds" attribute is provided. | ServiceExperience |

| | | | | | |
|--|------------------------------|---|------|---|------------------------------------|
| ratFreqs | array(RatFreqInformation) | O | 1..N | Identification(s) of the RAT type and/or frequencies of UE's serving cell(s) which the subscription applies. (NOTE 4) | ServiceExperience |
| appServerAdrs | array(AddrFqdn) | C | 1..N | Each of the element represents the Application Server Instance (IP address/FQDN of the Application Server). (NOTE 5) | ServiceExperience DnPerformance |
| disperReqs | array(DispersionRequirement) | O | 1..N | Represents the requirements of dispersion analytics. | Dispersion |
| maxNumOfTopAppUI | UInteger | O | 0..1 | Indicates the requested maximum number of top applications that contribute the most to the traffic in Uplink direction. Minimum = 1. May be included when one of the elements in the "listOfAnaSubsets" attribute is set to LIST_OF_TOP_APP_UL. | CongestionExt |
| maxNumOfTopAppDI | UInteger | O | 0..1 | Indicates the requested maximum number of top applications that contribute the most to the traffic in Downlink direction. Minimum = 1. May be included when one of the elements in the "listOfAnaSubsets" attribute is set to LIST_OF_TOP_APP_DL. | CongestionExt |
| visitedLocAreas | array(LocationArea5G) | O | 1..N | Identifications of network areas which the UEs had previously been in at least one of the Visited Area(s) of Interest. (NOTE 6) | Ue_Mobility |
| <p>NOTE 1: Either "exceptIds" 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 "anyUeInd" 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 "exceptIds" attribute is mobility related; - at least one of the "locArea", "appls", "dnn" and "snssai" attribute should be included, if the expected analytics type via the "exptAnaType" attribute or the list of Exception Ids via the "exceptIds" attribute is communication related; - the expected analytics type via the "exptAnaType" attribute or the list of Exception Ids via "exceptIds" attribute shall not be requested for both mobility and communication related analytics at the same time. <p>NOTE 4: If both the "allFreq" attribute and the "allRat" attribute within the "ratFreqs" attribute are present, then the cardinality shall be 1 as the "all" indication for all the RAT type and Frequency value the NWDAF has received for the application.</p> <p>NOTE 5: This parameter shall be provided when a consumer requires analytics for an edge application over a UP path.</p> <p>NOTE 6: The NetworkAreaInfo within the "visitedLocAreas" attribute is not applicable for the untrusted AF. If this attribute is provided, the analytics target period shall be a past time period (i.e. only statistics is supported).</p> | | | | | |

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 |
|--|----------------------------------|---|-------------|--|---------------------|
| start | DateTime | O | 0..1 | It defines the start time of which the analytics information will become valid. (NOTE 1) | EneNA |
| expiry | DateTime | O | 0..1 | Defines the expiration time after which the analytics information will become invalid. (NOTE 1) | |
| timeStampGen | DateTime | O | 0..1 | It defines the timestamp of analytics generation. | EneNA |
| 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 | Contains the network performance information. Shall be present if the "analyEvent" attribute is set to "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". (NOTE 2) | QoS_Sustainability |
| disperInfos | array(DispersionInfo) | C | 1..N | Contains the Dispersion information. Shall be present if the "analyEvent" attribute is set to "DISPERSION". | Dispersion |
| dnPerfInfos | array(DnPerfInfo) | C | 1..N | Contains the DN performance information. Shall be present if the "analyEvent" attribute is set to "DN_PERFORMANCE". | DnPerformance |
| svcExps | array(ServiceExperienceInfo) | C | 1..N | Contains the service experience information. Shall be present if the "analyEvent" attribute is set to "SERVICE_EXPERIENCE". | ServiceExperience |
| suppFeat | SupportedFeatures | M | 1 | Represents the features supported by both the AF and the NEF. | |
| NOTE 1: If the "start" attribute and the "expiry" attribute are both provided, the DateTime of the "expiry" attribute shall not be earlier than the DateTime of the "start" attribute. | | | | | |
| NOTE 2: The "qosFlowRetThd" and "ranUeThrouThd" attributes in QosSustainabilityExposure data type are not applicable. | | | | | |

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. | |
| except | 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. | |
| dnn | Dnn | O | 0..1 | Identifies DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only. | Abnormal_Behavior_Ext |
| snssai | Snssai | O | 0..1 | Identifies the network slice information. | Abnormal_Behavior_Ext |
| ratio | SamplingRatio | C | 0..1 | This attribute contains the percentage of UEs with same analytics result in the group or among all UEs. Shall be present if the analytics result applies for a group of UEs or any UE. | |
| confidence | UInteger | C | 0..1 | Indicates the confidence of the prediction. (NOTE) Shall be present if the analytics result is a prediction. Minimum = 0. Maximum = 100. | |
| addtMeasInfo | AdditionalMeasurement | O | 0..1 | Additional measurement. | |
| NOTE: If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned. | | | | | |

5.6.3.3.16 Type CongestInfo

Table 5.6.3.3.16-1: Definition of type CongestInfo

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|--|----------------------------|---|-------------|--|---------------|
| locArea | LocationArea5G | M | 1 | Network area of interest. (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. Minimum = 0. Maximum = 100. | |
| topAppListUl | array(TopApplication) | C | 1..N | List of top applications in Uplink. Shall be present if one of the element in the "listOfAnaSubsets" attribute was set to LIST_OF_TOP_APP_UL. | CongestionExt |
| topAppListDl | array(TopApplication) | C | 1..N | List of top applications in Downlink. Shall be present if one of the element in the "listOfAnaSubsets" attribute was set to LIST_OF_TOP_APP_DL. | CongestionExt |
| 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) | |
| snssai | Snssai | O | 0..1 | Identifies the network slice information. | QoS_Sustainability_Ext |
| confidence | UInteger | C | 0..1 | Indicates the confidence of the prediction. (NOTE 2) Shall be present if the analytics result is a prediction. Minimum = 0. Maximum = 100. | |
| NOTE 1: | Either qosFlowRetThd or ranUeThrouThd shall be provided. | | | | |
| NOTE 2: | If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned. | | | | |
| 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. Minimum = 0. Maximum = 100. | |
| NOTE 1: Either relativeRatio or absoluteNum shall be provided. | | | | | |
| NOTE 2: If the requested period identified by the "startTs" and "endTs" attributes in the "EventReportingRequirement" type is a future time period, which means the analytics result is a prediction. If no sufficient data is collected to provide the confidence of the prediction before the time deadline, a zero confidence shall be returned. | | | | | |
| 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 clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

5.6.3.4.2 Simple data types

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

Table 5.6.3.4.2-1: Simple data types

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

5.6.3.4.3 Enumeration: AnalyticsEvent

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

Table 5.6.3.4.3-1: Enumeration AnalyticsEvent

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

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. | |
| UNSATISFIED_REQUESTED_ANALYTICS_TIME | Indicates that the requested event is rejected since the analytics information is not ready when the time indicated by the "timeAnaNeeded" attribute (as provided during the creation or modification of subscription) is reached. | EneNA |
| 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 clause 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. |
| 11 | DnPerformance | This feature indicates the support of the analytics event related to DN performance. |
| 12 | ServiceExperience | This feature indicates support for the event related to service experience. |
| 13 | CongestionExt | This feature indicates support for the extensions to the event related to user data congestion, including support of GPSI and/or list of Top applications. Supporting this feature also requires the support of feature Congestion. |
| 14 | Abnormal_Behavior_Ext | This feature indicates support for the extensions to the event related to abnormal behavior, including support of exposing DNN and S-NSSAI information. Supporting this feature also requires the support of feature Abnormal_Behavior. |
| 15 | QoS_Sustainability_Ext | This feature indicates support for the extensions to the event related to QoS sustainability, including support of exposing S-NSSAI information. Supporting this feature also requires the support of feature QoS_Sustainability. |

5.6.5 Error handling

5.6.5.1 General

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

In addition, the requirements in the following clauses 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.

Table 5.6.5.3-1: Application errors

| Application Error | HTTP status code | Description |
|--------------------------------------|---------------------------|---|
| 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. |
| UNSATISFIED_REQUESTED_ANALYTICS_TIME | 500 Internal Server Error | Indicates that the requested event is rejected since the analytics information is not ready when the time indicated by the "timeAnaNeeded" attribute (as provided during the request) is reached. |

5.7 5GLANParameterProvision API

5.7.1 Resources

5.7.1.1 Overview

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

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

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

This clause 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.

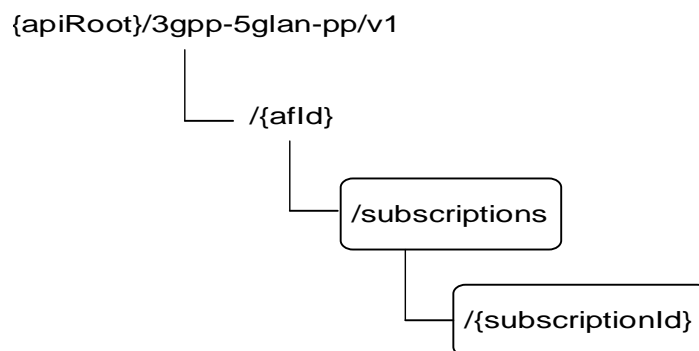


Figure 5.7.1.1-1: Resource URI structure of the 5GLANParameterProvision API

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 | /{afld}/subscriptions | GET | Read all subscriptions for a given AF |
| | | POST | Create a new subscription to provision parameters |
| Individual 5GLAN Parameters Provision 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 properties of an existing subscription identified by {subscriptionId} |
| | | DELETE | Delete a subscription identified by {subscriptionId} |

5.7.1.2 Resource: 5GLAN Parameters Provision Subscriptions

5.7.1.2.1 Introduction

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

5.7.1.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-5gla-pp/v1/{afld}/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 | Clause 5.2.4 of 3GPP TS 29.122 [4]. |
| afld | string | Identifier of the AF. |

5.7.1.2.3 Resource Methods

5.7.1.2.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 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(5GLanParametersProvision) | 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 clause 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 clause 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/{afld}/subscriptions/{subscriptionId} |

5.7.1.3 Resource: Individual 5GLAN Parameters Provision Subscription

5.7.1.3.1 Introduction

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

5.7.1.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-5glan-pp/v1/{afld}/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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 |
|-----------------------------------|---|-------------|--|
| 5GLanParameter sProvisionPatch | 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 |
|------------------------------|---|-------------|------------------------|--|
| 5GLanParameter sProvision | 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 clause 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 clause 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 clause 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 osId. | |
| <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. | |
| appIds | 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 |
|----------------|----------------------|---|-------------|--|---------------|
| appIds | 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 clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

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 clause 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. |

5.7.4 Error handling

5.7.4.1 General

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

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

5.7.4.2 Protocol Errors

In this Release of the specification, there are no additional protocol errors applicable for the 5GLANParameterProvision API.

5.7.4.3 Application Errors

The application errors defined for 5GLANParameterProvision API are listed in table 5.7.4.3-1.

Table 5.7.4.3-1: Application errors

| Application Error | HTTP status code | Description | Applicability |
|-------------------|------------------|-------------|---------------|
| | | | |

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 clause 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 clauses below are defined relative to the above root URI.

This clause 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.

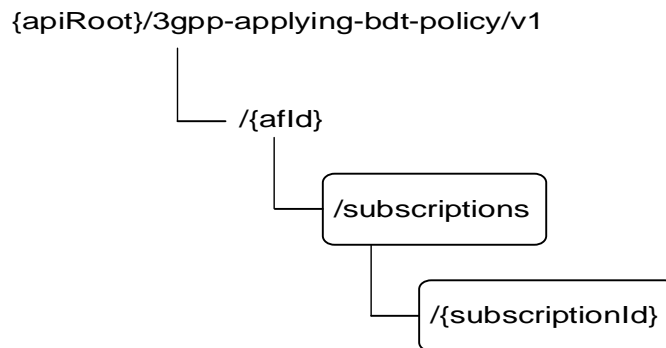


Figure 5.8.1.1-1: Resource URI structure of the ApplyingBdtPolicy API

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 | /{afId}/subscriptions | GET | Read all applied BDT policy subscriptions for a given AF. |
| | | POST | Create a new applied policy subscription. |
| Individual Applied BDT Policy Subscription | /{afId}/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/{afId}/subscriptions

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

Table 5.8.1.2.2-1: Resource URI variables for this resource

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

5.8.1.2.3 Resource Methods

5.8.1.2.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. | | | | |

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

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

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

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

5.8.1.3.3.3 PATCH

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

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

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

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

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

| Data type | P | Cardinality | Response codes | Description |
|--|---|-------------|------------------------|--|
| AppliedBdtPolicy | M | 1 | 200 OK | The subscription was modified successfully. |
| n/a | | | 204 No Content | The subscription was modified successfully. |
| N/A | | | 307 Temporary Redirect | Temporary redirection, during subscription modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 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 clause 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 clause 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 clause 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 clause 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 |
|-------------------|--------------------|--|
| BdtReferenceId | 3GPP TS 29.122 [4] | Identifier of a selected BDT policy. |
| Gpsi | 3GPP TS 29.571 [8] | Identifies a GPSI. |
| ExternalGroupId | 3GPP TS 29.122 [4] | External Group Identifier for a user group. |
| SupportedFeatures | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features defined in table 5.8.4-1. |

5.8.3.3 Structured data types

5.8.3.3.1 Introduction

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

5.8.3.3.2 Type: AppliedBdtPolicy

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

Table 5.8.3.3.2-1: Definition of type AppliedBdtPolicy

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

NOTE: Only one of the properties "gpsi" or "externalGroupId" shall be included.

5.8.3.3.3 Type: AppliedBdtPolicyPatch

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

Table 5.8.3.3.2-1: Definition of type AppliedBdtPolicyPatch

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

5.8.3.4 Simple data types and enumerations

5.8.3.4.1 Introduction

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

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 clause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.8.4-1: Features used by ApplyingBdtPolicy API

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

5.8.5 Error handling

5.8.5.1 General

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

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

5.8.5.2 Protocol Errors

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

5.8.5.3 Application Errors

The application errors defined for ApplyingBdtPolicy API are listed in table 5.8.5.3-1.

Table 5.8.5.3-1: Application errors

| Application Error | HTTP status code | Description | Applicability |
|-------------------|------------------|-------------|---------------|
| | | | |

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 clause 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 clauses below are defined relative to the above root URI.

This clause 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.

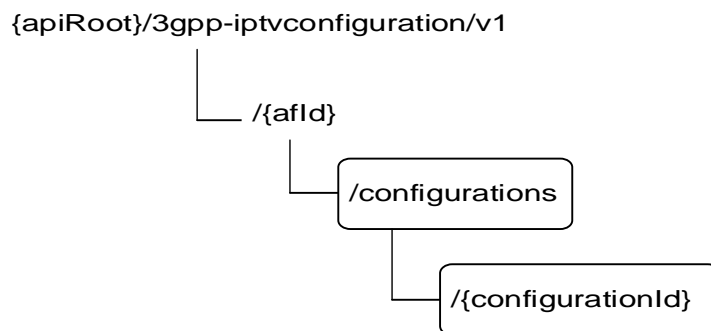


Figure 5.9.1.1-1: Resource URI structure of the IPTVConfiguration API

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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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. |
| 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] | |
| MtcProviderInformation | 3GPP TS 29.571 [8] | Indicates MTC provider information. |
| Snssai | 3GPP TS 29.571 [8] | Identifies the S-NSSAI. |
| SupportedFeatures | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features defined in table 5.9.3-1. |

5.9.2.3 Structured data types

5.9.2.3.1 Introduction

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

5.9.2.3.2 Type: IptvConfigData

Table 5.9.2.3.2-1: Definition of type IptvConfigData

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|-----------------------------|---|-------------|---|---------------|
| self | Link | C | 0..1 | Identifies the individual IPTV configuration resource URI. Shall be present in the HTTP GET response when reading all the configurations for an AF. | |
| gpsi | Gpsi | C | 0..1 | Identifies GPSI. (NOTE) | |
| exterGroupld | ExternalGroupld | C | 0..1 | Represents a group of users. (NOTE) | |
| afAppld | string | M | 1 | Identifies an application. | |
| dnn | Dnn | O | 0..1 | Identifies a DNN, a full DNN with both the Network Identifier and Operator Identifier, or a DNN with the Network Identifier only. | |
| 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 |
|---|-------------------|---|-------------|---|---------------|
| srcIpv4Addr | Ipv4Addr | O | 0..1 | Identifies the source IPv4 address of IPTV multicast channel. | |
| srcIpv6Addr | Ipv6Addr | O | 0..1 | Identifies the source IPv6 address of IPTV multicast channel. | |
| multicastV4Addr | Ipv4Addr | O | 0..1 | Identifies the multicast IPv4 address of IPTV multicast channel. (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 clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

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 clause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.9.3-1: Features used by IPTVConfiguration API

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

5.9.4 Error handling

5.9.4.1 General

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

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

5.9.4.2 Protocol Errors

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

5.9.4.3 Application Errors

The application errors defined for IPTVConfiguration API are listed in table 5.9.4.3-1.

Table 5.9.4.3-1: Application errors

| Application Error | HTTP status code | Description | Applicability |
|-------------------|------------------|-------------|---------------|
| | | | |

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 clause 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 clauses below are defined relative to the above root URI.

This clause 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.

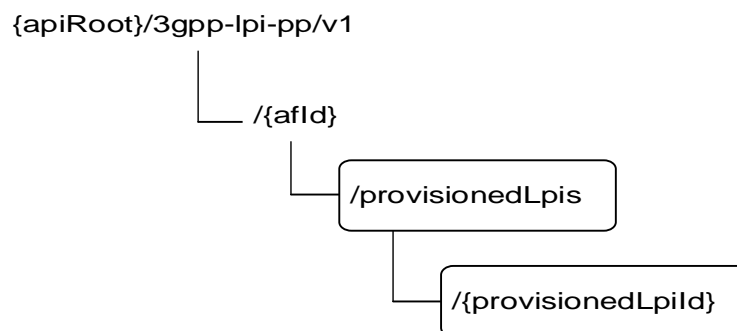


Figure 5.10.1.1-1: Resource URI structure of the LpiParameterProvision API

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 (NOTE) | 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} (NOTE) | 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} |
| NOTE: The path segment "provisionedLpis" does not follow the related naming convention defined in clause 5.2. The path segment is however kept as currently defined in this specification for backward compatibility considerations. | | | |

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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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(LpiParametersProvision) | 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 clause 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 clause 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 |
|------------------------|---|-------------|--|
| LpiParametersProvision | 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/{provisionedLpild}

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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 provisionedLpild. 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

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 clause 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). |

5.10.4 Error handling

5.10.4.1 General

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

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

5.10.4.2 Protocol Errors

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

5.10.4.3 Application Errors

The application errors defined for LpiParameterProvision API are listed in table 5.10.4.3-1.

Table 5.10.4.3-1: Application errors

| Application Error | HTTP status code | Description | Applicability |
|-------------------|------------------|-------------|---------------|
| | | | |

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 clause 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 clauses below are defined relative to the above root URI.

This clause 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.

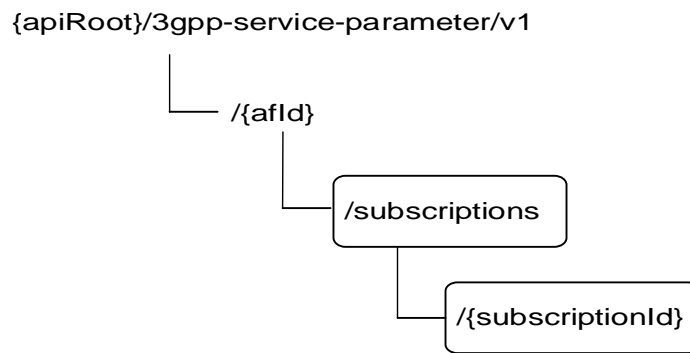


Figure 5.11.1.1-1: Resource URI structure of the ServiceParameter API

Table 5.11.1.1-1 provides an overview of the resources and HTTP methods applicable for the ServiceParameter API.

Table 5.11.1.1-1: Resources and methods overview

| Resource name | Resource URI | HTTP method | Description |
|---|--|-------------|--|
| Service Parameter Subscriptions | /{afId}/subscriptions | GET | Read all subscriptions for a given AF. |
| | | POST | Create a new service parameter subscription. |
| Individual Service Parameter Subscription | /{afId}/subscriptions/{subscriptionId} | GET | Read an existing subscription identified by {subscriptionId} |
| | | PUT | Modify all of the properties of an existing subscription identified by {subscriptionId} |
| | | PATCH | Modify some of the properties of an existing subscription identified by {subscriptionId} |
| | | DELETE | Delete a subscription identified by {subscriptionId} |

5.11.1.2 Resource: Service Parameter Subscriptions

5.11.1.2.1 Introduction

This resource allows a AF to read all active Service Parameter Subscriptions for the given AF, or create an new individual service parameter subscription in the NEF.

5.11.1.2.2 Resource Definition

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

This resource shall support the resource URI variables defined in table 5.11.1.2.2-1.

Table 5.11.1.2.2-1: Resource URI variables for this resource

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

5.11.1.2.3 Resource Methods

5.11.1.2.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 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 |
|---|------------------|---|-------------|---|---------------|
| gpsis | array(Gpsi) | O | 1..N | The GPSI of the requested UE(s). | EnNB |
| ip-addr | array(IpAddr) | O | 1..N | The IP address(es) of the requested UE(s). | EnNB |
| ip-domain | string | O | 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 | 1..N | The MAC address(es) of the requested UE(s). | EnNB |
| NOTE: One of the "gpsis" parameter, the "ip-addr" parameter or the "mac-addr" parameter may be provided in the same request. If multiple elements are provided in the array data structure, then each element shall be treated as a separate query parameter. | | | | | |

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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. | | | | |

Table 5.11.1.2.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.11.1.2.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.11.1.2.3.3 POST

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

This method shall support the request data structures specified in table 5.11.1.2.3.3-1 and the response data structures and response codes specified in table 5.11.1.2.3.3-2.

Table 5.11.1.2.3.3-1: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------------------|---|-------------|---|
| ServiceParameter Data | M | 1 | Parameters to create a service parameter subscription resource. |

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

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|----------------|---|
| ServiceParameter Data | M | 1 | 201 Created | The subscription resource was created successfully. 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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 5.11.1.3.3.

5.11.1.3.3.2 GET

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

This method shall support the URI query parameters specified in table 5.11.1.3.3.2-1.

Table 5.11.1.3.3.2-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 5.11.1.3.3.2-2 and the response data structures and response codes specified in table 5.11.1.3.3.2-3.

Table 5.11.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

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

Table 5.11.1.3.3.2-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|--|---|-------------|------------------------|---|
| ServiceParameter Data | M | 1 | 200 OK | The information for the subscription in the request URI are returned. |
| N/A | | | 307 Temporary Redirect | Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NEF. Redirection handling is described in clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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/modification of the subscription within the ServiceParameterData data type as defined in Table 5.11.2.3.2-1 or the ServiceParameterDataPatch data type as defined in Table 5.11.2.3.3-1. |

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 clause 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 clause 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 clause 5.2.5.4 of 3GPP TS 29.122 [4].

5.11.2 Data Model

5.11.2.1 General

This clause 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 |
|-----------------------------|----------------|---|-----------------|
| AfNotification | 5.11.2.3.6 | Contains the reported event notification or the service parameters authorization update result. | AfNotifications |
| AuthorizationResult | 5.11.2.4.4 | | AfNotifications |
| ConnectionCapabilities | 5.11.2.4.6 | UE application requests a network connection with certain capabilities. | AfGuideURSP |
| Event | 5.11.2.4.3 | Identifies the AF subscribed events. | AfNotifications |
| EventInfo | 5.11.2.3.7 | Indicates the event information. | AfNotifications |
| Failure | 5.11.2.4.5 | Represents the failure reason for the unsuccessful result. | AfNotifications |
| GeographicalArea | 5.17.3.3.4 | Identifies the geographical area information. | 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. |
| ExternalGroupld | 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) | C | 1..N | Identifies the AF subscribed event(s) notifications related to AF provisioned service parameters. (NOTE 4) | 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 clause 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. | |
| suppFeat | SupportedFeatures | C | 0..1 | Indicates the list of Supported features used as described in clause 5.11.3. This attribute shall be provided in the POST request and in the response of successful resource creation. | |

| |
|--|
| NOTE 1: One of individual UE identifier (i.e. "gpsi", "uelpv4", "uelpv6" or "ueMac" attribute), External Group Identifier (i.e. "exterGroupIid" 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 "exterGroupIid" attributes are applicable. |
| 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. |
| 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. |
| NOTE 4: The attribute may be present when the individual UE identifier (i.e. "gpsi", "uelpv4", "uelpv6" or "ueMac" attribute) is present. |

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 |
| paramForProSeRemUe | 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) | |
| relatPrecedence | UInteger | O | 0..1 | Represents the relative precedence of the URSP rule within the same AF request, Lower values take precedence over higher values. Its absence means that the AF has no relative precedence requirement for the provided URSP rules. | |
| 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 the "trafficDesc" attribute is not present, the NEF may derive the traffic descriptor components from the AF Service Identifier. | | | | | |
| NOTE 2: if the "routeSelParamSets" attribute is not present, the NEF may derive S-NSSAI/DNN and/or other related parameters from the AF Service 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. | |
| snsai | Snsai | 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. | |
| spatialValidityAreas | array(GeographicalArea) | O | 1..N | Indicates where the route selection parameters apply. It may correspond to a geographical area (e.g. a geographic shape that is known to the AF and is configured by the operator to correspond to a list of TAs). | |
| spatialValidityTais | array(Tai) | O | 1..N | Indicates the TAs 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 "subNotifEvents" 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) | |
| gpsis | array(Gpsi) | C | 1..N | Identifies the list of GPSI(s) of the reported UE(s). May be present if the "exterGroupIid" attribute or "anyUeIid" attribute is included in the AF subscription transaction and only if the "authResult" attribute is provided. | |
| dnn | Dnn | O | 0..1 | Identifies a DNN. | |
| snssai | Snssai | 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. | | | | | |

5.11.2.3.7 Type: EventInfo

Table 5.11.2.3.7-1: Definition of type EventInfo

| 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 clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 Failure 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. |
| UE_TEMP_UNREACHABLE | Indicates the PCF received the notification from the AMF that the UE is not reachable but the PCF will retry again. |

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 clause 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]. |
| 6 | AfGuideURSP | This feature indicates the support of AF guidance for URSP determination. |

5.11.4 Error handling

5.11.4.1 General

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

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

5.11.4.2 Protocol Errors

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

5.11.4.3 Application Errors

The application errors defined for ServiceParameter API are listed in table 5.11.4.3-1.

Table 5.11.4.3-1: Application errors

| Application Error | HTTP status code | Description | Applicability |
|-------------------|------------------|-------------|---------------|
| | | | |

5.12 ACSPParameterProvision API

5.12.1 Resources

5.12.1.1 Overview

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

{apiRoot}/3gpp-acp-pp/v1

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

This clause 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.

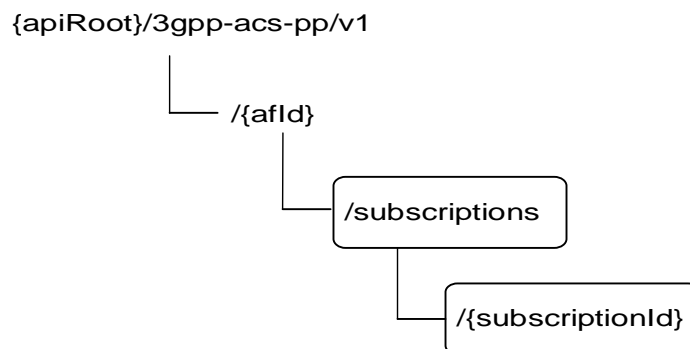


Figure 5.12.1.1-1: Resource URI structure of the ACSPParameterProvision API

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 | /{afld}/subscriptions | GET | Read all subscriptions for a given AF. |
| | | POST | Create a new ACS configuration subscription. |
| Individual ACS Configuration Subscription | /{afld}/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/{afld}/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 | Clause 5.2.4 of 3GPP TS 29.122 [4]. |
| afld | Identifier of the AF of type string. |

5.12.1.2.3 Resource Methods

5.12.1.2.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 |
|----------------------|---|-------------|---|
| AcsConfigurationData | 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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 theNEF 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 5.12.1.3.3A-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 5.12.1.3.3A-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 clause 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 clause 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 clause 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 |
| 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] | |
| 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 | MtcProviderInfor mation | O | 0..1 | Indicates MTC provider information. | |
| suppFeat | SupportedFeatur es | M | 1 | Indicates the list of Supported features used as described in clause 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 | MtcProviderInfor mation | O | 0..1 | Indicates MTC provider information. | |

5.12.2.4 Simple data types and enumerations

5.12.2.4.1 Introduction

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

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 clause 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). |

5.12.4 Error handling

5.12.4.1 General

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

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

5.12.4.2 Protocol Errors

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

5.12.4.3 Application Errors

The application errors defined for ACSParameterProvision API are listed in table 5.12.4.3-1.

Table 5.12.4.3-1: Application errors

| Application Error | HTTP status code | Description | Applicability |
|-------------------|------------------|-------------|---------------|
| | | | |

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 clause 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 clause 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 clause 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 clause 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 clause 5.13.4. | |

5.13.3.4 Simple data types and enumerations

5.13.3.4.1 Introduction

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

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 clause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.13.4-1: Features used by MoLcsNotify API

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

5.13.5 Error handling

5.13.5.1 General

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

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

5.13.5.2 Protocol Errors

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

5.13.5.3 Application Errors

The application errors defined for MoLcsNotify API are listed in table 5.13.5.3-1.

Table 5.13.5.3-1: Application errors

| Application Error | HTTP status code | Description | Applicability |
|-------------------|------------------|-------------|---------------|
| | | | |

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 clause 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 clauses 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.

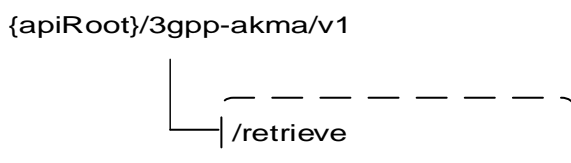


Figure 5.14.3.1-1: Custom operation URI structure of the AKMA API

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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| ProblemDetails | O | 0..1 | 403 Forbidden | (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 cases are described in subclause 5.14.7.

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 clause 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 5.14.5.2-1.

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 | |
| anonInd | boolean | O | 0..1 | Indicates whether an anonymous user access. Set to "true" if an anonymous user access is requested; otherwise set to "false". Default value is "false" if omitted. | |
| suppFeat | SupportedFeatures | O | 0..1 | Indicates the list of Supported features used as described in clause 5.14.6. | |

NOTE: Properties marked with a feature as defined in clause 5.14.6 are applicable as described in clause 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 of the UE. (NOTE 2, NOTE x) | |
| supi | Supi | C | 0..1 | Indicates the SUPI of the UE. (NOTE 2) | |
| 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 clause 5.14.6 are applicable as described in clause 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.

NOTE 3: When the "anonInd" attribute contained in AkmaAfKeyRequest data type is set to "true" in the incoming request, the "gpsi" attribute shall not be included.

5.14.5.4 Simple data types and enumerations

5.14.5.4.1 Introduction

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

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 a string of 5 octet and the identification of the Ua* security protocol is specified as Ua security protocol identifier in Annex H of 3GPP TS 33.220 [39] that the AF will use with the UE. Example: 1. FQDN: www.app1.com , Ua* security protocol id: 0100BC0001, then AfId: www.app1.com.0100BC0001 | |
| AKId | string | AKMA Key Identifier shall be in NAI format as specified in clause 2.2 of IETF RFC 7542 [40], which is formatted as the following string: "<username>@<realm>", wherein, <username> shall include Routing Indicator and the A-TID in the format "rid<value>.atid<value>", where "rid" and "atid" are labels indicating Routing Indicator and A-TID and <realm> shall include Home Network Id. Example: 1. If Routing Indicator: 012, A-TID: 019345346 and Home Network Id: 5gc.mnc012.mcc345.3gppnetwork.org, then AKId: rid012.akid019345346@5gc.mnc012.mcc345.3gppnetwork.org Routing Indicator, Home Network Id are specified in 3GPP TS 23.003 [55]. A-TID is specified in 3GPP TS 33.535 [38]. | |

5.14.6 Used Features

The table below defines the features applicable to the AKMA API. Those features are negotiated as described in clause 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 clause 5.2.6 of 3GPP TS 29.122 [4].

In addition, the requirements in the following clauses 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 clause 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 clauses below are defined relative to the above root URI.

This clause 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.

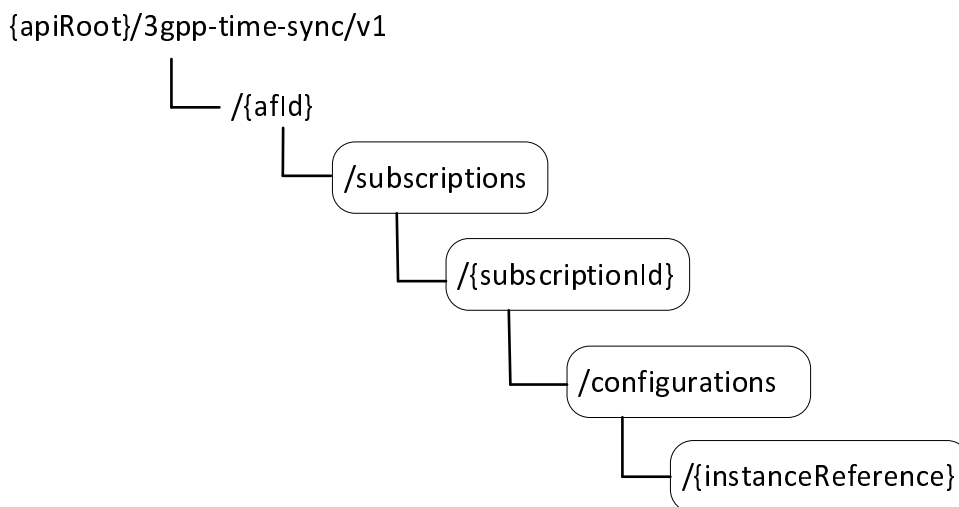


Figure 5.15.1.1-1: Resource URI structure of the TimeSyncExposure API

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 |
| | | 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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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/{afld}/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/{afld}/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 | Clause 5.2.4 of 3GPP TS 29.122 [4]. |
| afld | 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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. |

5.15.2 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/modification 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 |
|-------------------------------|---|-------------|---|
| TimeSyncExposu reSubsNotif | 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 clause 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 clause 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 5.15.3.2.3.1-3: 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 Synchroniaition Capability Notification may alternatively be delivered through the Websocket mechanism as defined in clause 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/modification 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 |
|---------------------------------|---|-------------|---|
| TimeSyncExposu reConfigNotif | M | 1 | Provides the current state of time synchroniziation service configuration by the NEF to the AF. |

Table 5.15.5.3.3.1-2: 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 clause 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 clause 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 5.15.3.3.1-3: 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 clause 5.2.5.4 of 3GPP TS 29.122 [4].

5.15.4 Data Model

5.15.4.1 General

This clause 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 |
|-----------------------------|----------------|--|---------------|
| 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 PTP port state of the time synchronization configuration. | |
| StateOfDstt | 5.15.4.3.19 | Contains the PTP port state of a DS-TT | |
| 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 |
|--------------------|---------------------|---|
| DateTime | 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. |
| 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. |
| 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 |
|------------------|-------------------------|---|-------------|--|---------------|
| exterGroupId | ExternalGroupId | 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) | |
| anyUeInd | 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(SubscribedEvents) | 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 clause 5.2.5.3 of 3GPP TS 29.122 [4]. Set to false or omitted otherwise. | Notification_test_event |
| websocketNotification | WebsocketNotification | 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. | |
| reqPtPIns | 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. | |
| timeSyncErrBdg t | 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 |
|----------------|---------------------|---|-------------|---|---------------|
| instanceTypes | 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 Void
- 5.15.4.3.14 Void
- 5.15.4.3.15 Void
- 5.15.4.3.16 Void
- 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 |
|---|--------------------|---|-------------|---|---------------|
| stateOfNwtt | boolean | O | 0..1 | When the PTP port state is Leader, Follower or Passive, it is included and set to true to indicate the state of configuration for NW-TT port is active; when PTP port state is in any other case, it is included and set to false to indicate the state of configuration for NW-TT port is inactive. Default value is false. (NOTE) | |
| stateOfDstts | array(StateOfDdst) | O | 1..N | Contains the PTP port states of the DS-TT(s). | |
| NOTE: Leader and Follower terms in this specification are aligned with NOTE 2 in clause 5.27.1.2.2.1 of 3GPP TS 23.501 [3]. | | | | | |

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.

5.15.4.3.19 Type: StateOfDstt

Table 5.15.4.3.19-1: Definition of type StateOfDstt

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|--|-----------|---|-------------|--|---------------|
| gpsi | Gpsi | M | 1 | Identifies the UE/DS-TT which the parameters below apply. | |
| state | boolean | M | 1 | When the PTP port state is Leader, Follower or Passive, it is included and set to true to indicate the state of configuration for DS-TT port is active; when PTP port state is in any other case, it is included and set to false to indicate the state of configuration for DS-TT port is inactive. Default value is false. | |
| NOTE: Leader and Follower terms in this specification are aligned with NOTE 2 in clause 5.27.1.2.2.1 of TS 23.501 [3]. | | | | | |

5.15.4.4 Simple data types and enumerations

5.15.4.4.1 Introduction

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

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. |

5.15.4.4.7 Enumeration: InstanceType

Table 5.15.4.4.7-1: 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 clause 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 clause 5.2.6 of 3GPP TS 29.122 [4].

In addition, the requirements in the following clauses 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.

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 clause 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 clauses below are defined relative to the above root URI.

This clause 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.

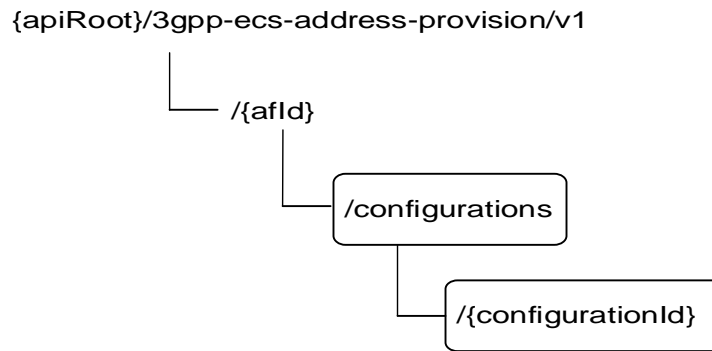


Figure 5.16.1.1-1: Resource URI structure of the EcsAddressProvision API

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/{afld}/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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

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 clause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.16.3-1: Features used by EcsAddressProvision API

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

5.16.4 Error handling

5.16.4.1 General

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

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

5.16.4.2 Protocol Errors

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

5.16.4.3 Application Errors

The application errors defined for EcsAddressProvision API are listed in table 5.16.4.3-1.

Table 5.16.4.3-1: Application errors

| Application Error | HTTP status code | Description | Applicability |
|-------------------|------------------|-------------|---------------|
| | | | |

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 clause 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 clauses below are defined relative to the above root URI.

This clause 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.

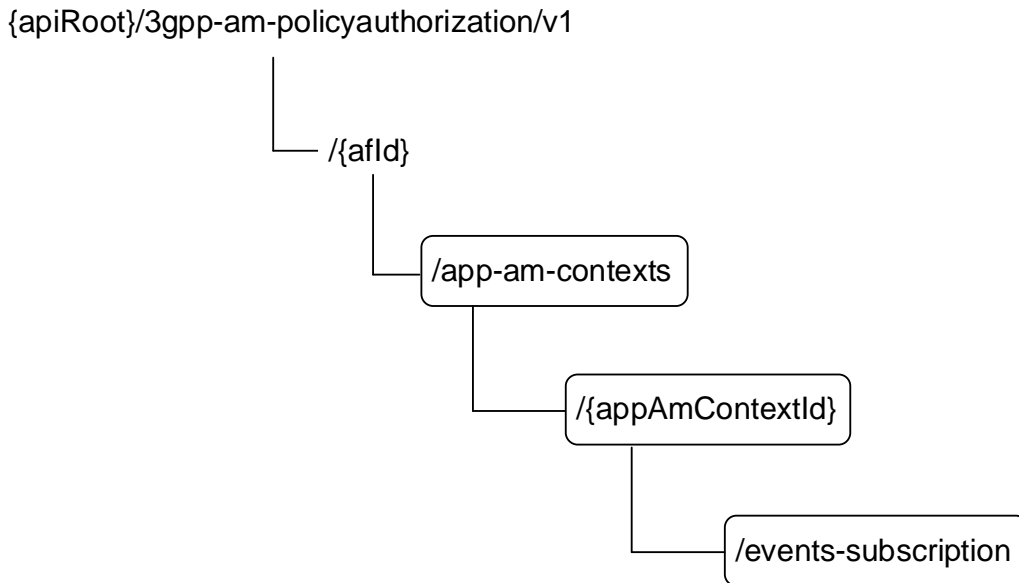


Figure 5.17.1.1-1: Resource URI structure of the AMPolicyAuthorization API

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/{afId}/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 | Clause 5.2.4 of 3GPP TS 29.122 [4]. |
| afId | string | Identifier of the AF. |

5.17.1.2.3 Resource Methods

5.17.1.2.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 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 clause 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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 | Clause 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 clauses specify the resource methods supported by the sub-resource as described in clause 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 clause 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 clause 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 clause 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/{afld}/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 clause 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 clause 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 clause 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 clause 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/modification of the subscription within the AM policy events subscription sub-resource as defined in Table 5.17.3.3.2-1 or Table 5.17.3.3.3-1 or Table 5.6.2.4-1 of 3GPP TS 29.534 [43]. |

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 clause 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 clause 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 clause 5.2.5.4 of 3GPP TS 29.122 [4].

5.17.3 Data Model

5.17.3.1 General

This clause 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. |
| DurationSecRm | 3GPP TS 29.122 [4] | Indicates the time duration, same as the "DurationSec" data type, but with the OpenAPI "nullable: true" property. |
| 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 | AmEventsSubscData | O | 0..1 | 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. | |
| 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 clause 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 | AmEventsSubscDataRm | O | 0..1 | 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". | |
| covReqs | array(Geographical Area) | O | 1..N | Identifies the allowed geographical areas. (NOTE) | |
| policyDuration | DurationSecRm | O | 0..1 | Indicates the time duration that the policy shall last. | |
| NOTE: The value of the property shall be set to NULL for removal. | | | | | |

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 clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

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 clause 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 clause 5.2.6 of 3GPP TS 29.122 [4].

In addition, the requirements in the following clauses 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.

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. |
| APPLICATION_AM_CONTEXT_NOT_FOUND | 404 Not Found | The HTTP request is rejected because the specified Individual Application AM Context does not exist. |
| POLICY_ASSOCIATION_NOT_AVAILABLE | 500 Internal Server Error | The PCF failed in executing binding with the UE/AM Policy Context. |

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 clause 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 clauses below are defined relative to the above root URI.

This clause 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.

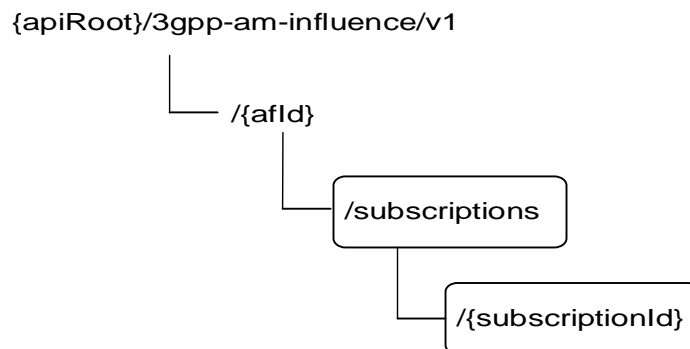


Figure 5.18.1.1-1: Resource URI structure of the AMInfluence API

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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 or the AmInfluSubPatch data type as defined in Table 5.18.3.3.3-1. |

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 clause 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 clause 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 clause 5.2.5.4 of 3GPP TS 29.122 [4].

5.18.3 Data Model

5.18.3.1 General

This clause 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 29.122 [4] | Indicates the time duration. |
| DurationSecRm | 3GPP TS 29.122 [4] | Indicates the time duration, same as the "DurationSec" data type, but with the OpenAPI "nullable: true" property. |
| ExternalGroupId | 3GPP TS 29.122 [4] | External Group Identifier for a user group. |
| GeographicalArea | 5.17.3.3.4 | Identifies the geographical area information. |
| Gpsi | 3GPP TS 29.571 [8] | Identifies a GPSI. |
| LinkRm | 3GPP TS 29.122 [4] | Indicates a referenced resource, same as the "Link" data type, but with the OpenAPI "nullable: true" property. |
| 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 clause 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. | |
| 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 clause 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 clause 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 clause 5.18.4 are applicable as described in clause 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. "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 |
|---|-----------------------------|---|-------------|---|---------------|
| highThruInd | boolean | O | 0..1 | Indicates whether high throughput is desired for UE traffic. Set to "true" if high throughput is desired; otherwise set to "false". | |
| geoAreas | array(Geographical Area) | O | 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. (NOTE 1) | |
| dnnSnssaiInfos | array(DnnSnssaiInformation) | O | 1..N | Each of the element identifies a combination of (DNN, S-NSSAI). (NOTE 1) | |
| subscribedEvents | array(AmInfluEvent) | O | 1..N | Identifies the requirement to be notified of the event(s). (NOTE 1) | |
| notificationDestination | LinkRm | O | 0..1 | Contains the Callback URL to receive the notification from the NEF. (NOTE 1, NOTE 2) | |
| afAppIds | array(string) | O | 1..N | Identifies application(s). (NOTE 1) | |
| NOTE 1: The value of the property shall be set to NULL for removal. | | | | | |
| NOTE 2: The notificationDestination attribute set to NULL may be included only if the subscribedEvents attribute is included and set to NULL. | | | | | |

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 clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

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 clause 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. | | |

5.18.5 Error handling

5.18.5.1 General

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

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

5.18.5.2 Protocol Errors

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

5.18.5.3 Application Errors

The application errors defined for AMInfluence API are listed in table 5.18.5.3-1.

Table 5.18.5.3-1: Application errors

| Application Error | HTTP status code | Description | Applicability |
|-------------------|------------------|-------------|---------------|
| | | | |

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 clause 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 clauses 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.

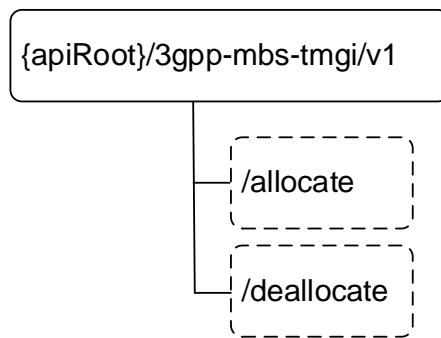


Figure 5.19.3.1-1: Custom operation URI structure of the MBSTMGI API

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 MBS 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 MBS TMGIs, expiry time) or the refreshed expiry time for the concerned already allocated MBS 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 clause 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 clause 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 of the resource 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 of the resource located in an alternative NEF. |

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 MBS TMGI(s) deallocation request information (e.g. list of MBS 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 requested MBS TMGI(s) are 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 clause 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 clause 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 of the resource 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 of the resource located in an alternative NEF. |

5.19.4 Notifications

5.19.4.1 General

Notifications shall comply to clause 5.2.5 of 3GPP TS 29.122 [4].

Table 5.19.4.1-1: Notifications overview

| Notification | Callback URI | HTTP method or custom operation | Description (service operation) |
|--|-------------------|---------------------------------|---|
| Notification of Allocated MBS TMGI(s) Timer Expiry | {notificationUri} | POST | Enable the NEF to notify an AF of the timer expiry for already allocated MBS TMGI(s). |

5.19.4.2 Notification of Allocated MBS 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 Target 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 URI provided by the AF during the MBS 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.

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 MBS TMGI(s) timer expiry notification information (e.g. list of MBS 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 clause 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 clause 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. |

5.19.4.2.3.2 Notification via Websocket

If supported by both AF and NEF and successfully negotiated, the Notification of Allocated MBS TMGI(s) Timer Expiry may alternatively be delivered through the Websocket mechanism as defined in clause 5.2.5.4 of 3GPP TS 29.122 [4].

5.19.5 Data Model

5.19.5.1 General

This clause 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 |
|------------------------|---------------------|--|---------------|
| ExternalMbsServiceArea | 3GPP TS 29.571 [8] | Represents an external MBS service area. | |
| MbsServiceArea | 3GPP TS 29.571 [8] | Represents an MBS service area. | |
| 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 clause 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 MBS TMGI(s). | |
| notificationUri | Uri | O | 0..1 | The notification URI via which the AF desires to receive notifications on timer expiry for MBS TMGI(s). | |
| mbsServiceArea | MbsServiceArea | O | 0..1 | Indicates the MBS service area for the TMGI(s) to be allocated. This attribute may be provided by the AF for a local MBS service. (NOTE) | |
| extMbsServiceArea | ExternalMbsServiceArea | O | 0..1 | Indicates the external MBS service area for the TMGI(s) to be allocated. This attribute may be provided by the AF for a local MBS service. (NOTE) | |
| requestTestNotification | boolean | O | 0..1 | Indicates whether sending a test notification shall be performed. Set to "true" by the AF to request the NEF to send a test notification as defined in clause 5.2.5.3 of 3GPP TS 29.122 [4]. Set to "false" or omitted otherwise. | Notification_test_event |
| websocketNotifConfig | WebsocketNotifConfig | O | 0..1 | Represents configuration parameters to set up notification delivery over the Websocket protocol. | Notification_websocket |
| suppFeat | SupportedFeatures | C | 0..1 | Indicates the features supported by the AF. This attribute shall be provided if feature negotiation needs to take place. | |

NOTE: These attributes are mutually exclusive. Either one of them may be present.

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 MBS TMGI(s) allocation information or the refreshed expiry time for already allocated MBS TMGI(s). | |
| suppFeat | SupportedFeatures | C | 0..1 | Indicates the features supported by both the AF and the NEF. This attribute shall be provided if feature negotiation needs to take place and it was provided by the AF in the corresponding request body. | |

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 MBS TMGI(s) for which the timer expired. | |

5.19.5.3 Simple data types and enumerations

5.19.5.3.1 Introduction

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

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 clause 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]. |

5.19.7 Error handling

5.19.7.1 General

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

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

5.19.7.2 Protocol Errors

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

5.19.7.3 Application Errors

The application errors defined for the MBSTMGI API are listed in table 5.19.7.3-1.

Table 5.19.7.3-1: Application errors

| Application Error | HTTP status code | Description |
|-------------------|------------------|-------------|
| | | |

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 clause 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 clauses below are defined relative to the above root URI.

5.20.2 Resources

5.20.2.1 Overview

This clause 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.

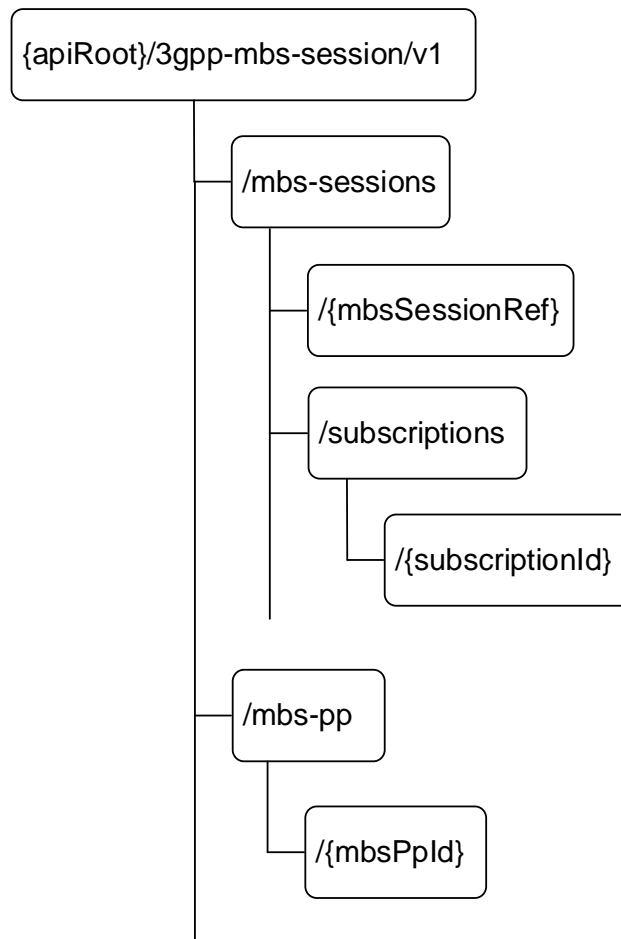


Figure 5.20.2.1-1: Resource URI structure of the MBSsession API

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/{mbsSessionRef} | 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. |
| MBS Parameters Provisionings | /mbs-pp | GET | Retrieve all the MBS Parameters Provisioning resources. |
| | | POST | Request the creation of a new MBS Parameters Provisioning. |
| Individual MBS Parameters Provisioning | /mbs-pp/{mbsPpId} | GET | Retrieve an existing individual MBS Parameters Provisioning resource. |
| | | PUT | Request the update of an existing Individual MBS Parameters Provisioning resource. |
| | | PATCH | Request the modification of an existing Individual MBS Parameters Provisioning resource. |
| | | DELETE | Request the deletion of an existing Individual MBS Parameters Provisioning 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 clause 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 clause 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 at 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. |
| ProblemDetails | O | 0..1 | 400 Bad Request | (NOTE 2) |
| ProblemDetails | O | 0..1 | 403 Forbidden | (NOTE 2) |
| ProblemDetails | O | 0..1 | 404 Not Found | (NOTE 2) |
| ProblemDetails | O | 0..1 | 500 Internal Server Error | (NOTE 2) |

NOTE 1: 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.

NOTE 2: Failure cases are described in clause 5.20.7.

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/{mbsSessionRef} |

5.20.2.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

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 clause C.1 of 3GPP TS 29.501 [3]).

5.20.2.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-mbs-session/v1/mbs-sessions/{mbsSessionRef}

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 clause 5.20.1. |
| mbsSessionRef | string | Contains the identifier of the Individual MBS Session resource assigned by the NEF. |

5.20.2.3.3 Resource Standard Methods

5.20.2.3.3.1 PATCH

The HTTP PATCH method enables an AF to request the modification of an existing Individual MBS Session resource at the NEF.

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 clause 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| ProblemDetails | O | 0..1 | 400 Bad Request | (NOTE 2) |
| ProblemDetails | O | 0..1 | 403 Forbidden | (NOTE 2) |
| ProblemDetails | O | 0..1 | 404 Not Found | (NOTE 2) |
| 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. | | | | |
| NOTE 2: Failure cases are described in clause 5.20.7. | | | | |

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 at 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 clause 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 clause 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 code for the DELETE method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. | | | | |
| NOTE 2: Failure cases are described in clause 5.20.7. | | | | |

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 in an alternative NEF. |

Table 5.20.2.3.3-5: 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. |

5.20.2.3.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

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 clause 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 clause 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 | 0..N | 200 OK | Successful case. All the 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 clause 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 clause 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. | | | | |

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 of the resource 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 at 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 is 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. | | | | |

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} |

5.20.2.4.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

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 clause 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 5.20.2.5.2-1.

Table 5.20.2.5.2-1: Resource URI variables for this resource

| Name | Data type | Definition |
|----------------|-----------|---|
| apiRoot | string | See clause 5.20.1. |
| subscriptionId | string | Identifier of the Individual MBS Session Subscription resource. |

5.20.2.5.3 Resource Methods

5.20.2.5.3.1 GET

This method enables an AF to request to retrieve an existing Individual MBS Session Subscription resource at 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. The requested Individual MBS Session Subscription resource 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 clause 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 clause 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. | | | | |

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 of the resource 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 existing 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 is 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 clause 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 clause 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. | | | | |

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 of the resource 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. |

5.20.2.5.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

5.20.2.6 Resource: MBS Parameters Provisionings

5.20.2.6.1 Introduction

This resource represents the collection of MBS Parameters Provisionings managed by the NEF.

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [3]).

5.20.2.6.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-mbs-session/v1/mbs-pp**

This resource shall support the resource URI variables defined in table 5.20.2.6.2-1.

Table 5.20.2.6.2-1: Resource URI variables for this resource

| Name | Data type | Definition |
|---------|-----------|--------------------|
| apiRoot | string | See clause 5.20.1. |

5.20.2.6.3 Resource Methods

5.20.2.6.3.1 GET

This method enables an AF to request to retrieve all the MBS Parameters Provisionings resources managed by the NEF.

This method shall support the URI query parameters specified in table 5.20.2.6.3.1-1.

Table 5.20.2.6.3.1-1: 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 5.20.2.6.3.1-2 and the response data structures and response codes specified in table 5.20.2.6.3.1-3.

Table 5.20.2.6.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.20.2.6.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| array(MbsPpData) | M | 1..N | 200 OK | Successful case. All the Individual MBS Parameters Provisionings 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 clause 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 clause 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. | | | | |

Table 5.20.2.6.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.20.2.6.3.1-5: 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. |

5.20.2.6.3.2 POST

This method enables an AF to request the creation of a new MBS Parameters Provisioning at the NEF.

This method shall support the URI query parameters specified in table 5.20.2.6.3.2-1.

Table 5.20.2.6.3.2-1: 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 5.20.2.6.3.2-2 and the response data structures and response codes specified in table 5.20.2.6.3.2-3.

Table 5.20.2.6.3.2-2: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|---|
| MbsPpData | M | 1 | Representation of the MBS session to be created in the NEF. |

Table 5.20.2.6.3.2-3: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|--|---|-------------|----------------|--|
| MbsPpData | M | 1 | 201 Created | Successful case. A representation of the created Individual MBS Parameters Provisioning 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. | | | | |

Table 5.20.2.6.3.2-4: 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-pp/{mbsPpId} |

5.20.2.6.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

5.20.2.7 Resource: Individual MBS Parameters Provisioning

5.20.2.7.1 Introduction

This resource represents an Individual MBS Parameters Provisioning resource managed by the NEF.

This resource is modelled with the Document resource archetype (see clause C.2 of 3GPP TS 29.501 [3]).

5.20.2.7.2 Resource Definition

Resource URI: {apiRoot}/3gpp-mbs-session/v1/mbs-pp/{mbsPpId}

This resource shall support the resource URI variables defined in table 5.20.2.7.2-1.

Table 5.20.2.7.2-1: Resource URI variables for this resource

| Name | Data type | Definition |
|---------|-----------|--|
| apiRoot | string | See clause 5.20.1. |
| mbsPpId | string | Identifier of the Individual MBS Parameters Provisioning resource. |

5.20.2.7.3 Resource Methods

5.20.2.7.3.1 GET

This method enables an AF to request to retrieve an existing Individual MBS Parameters Provisioning resource managed by the NEF.

This method shall support the URI query parameters specified in table 5.20.2.7.3.1-1.

Table 5.20.2.7.3.1-1: 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 5.20.2.7.3.1-2 and the response data structures and response codes specified in table 5.20.2.7.3.1-3.

Table 5.20.2.7.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.20.2.7.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| MbsPpData | M | 1 | 200 OK | Successful case. The requested Individual MBS Parameters Provisioning resource is successfully 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 clause 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 clause 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. | | | | |

Table 5.20.2.7.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.20.2.7.3.1-5: 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. |

5.20.2.7.3.2 PUT

This method enables an AF to request the update of an existing Individual MBS Parameters Provisioning resource at the NEF.

This method shall support the URI query parameters specified in table 5.20.2.7.3.2-1.

Table 5.20.2.7.3.2-1: 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 5.20.2.7.3.2-2 and the response data structures and response codes specified in table 5.20.2.7.3.2-3.

Table 5.20.2.7.3.2-2: Data structures supported by the PUT Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|--|
| MbsPpData | M | 1 | Represents the updated Individual MBS Parameters Provisioning resource representation. |

Table 5.20.2.7.3.2-3: Data structures supported by the PUT Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| MbsPpData | | | 200 OK | Successful response. The Individual MBS Parameters Provisioning resource is successfully updated and a representation of the updated resource is returned in the response body. |
| n/a | | | 204 No Content | Successful response. The Individual MBS Parameters Provisioning resource is successfully updated and no content is to be returned in the response body. |
| 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE 1: The mandatory HTTP error status code for the PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. | | | | |

Table 5.20.2.7.3.2-4: 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 5.20.2.7.3.2-5: 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. |

5.20.2.7.3.3 PATCH

This method enables an AF to request the modification of an existing Individual MBS Parameters Provisioning resource at the NEF.

This method shall support the URI query parameters specified in table 5.20.2.7.3.3-1.

Table 5.20.2.7.3.3-1: 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 5.20.2.7.3.3-2 and the response data structures and response codes specified in table 5.20.2.7.3.3-3.

Table 5.20.2.7.3.3-2: Data structures supported by the PATCH Request Body on this resource

| Data type | P | Cardinality | Description |
|----------------|---|-------------|--|
| MbsPpDataPatch | M | 1 | Represents the requested modifications to the Individual MBS Parameters Provisioning resource. |

Table 5.20.2.7.3.3-3: Data structures supported by the PATCH Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|-----------|---|-------------|------------------------|--|
| MbsPpData | | | 200 OK | Successful response. The Individual MBS Parameters Provisioning resource is successfully modified and a representation of the updated resource is returned in the response body. |
| n/a | | | 204 No Content | Successful response. The Individual MBS Parameters Provisioning resource is successfully modified and no content is to be returned in the response body. |
| 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 clause 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 clause 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.

Table 5.20.2.7.3.3-4: 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 5.20.2.7.3.3-5: 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. |

5.20.2.7.3.4 DELETE

This method enables an AF to request the deletion of an existing Individual MBS Parameters Provisioning resource at the NEF.

This method shall support the URI query parameters specified in table 5.20.2.7.3.4-1.

Table 5.20.2.7.3.4-1: 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 5.20.2.7.3.4-2 and the response data structures and response codes specified in table 5.20.2.7.3.4-3.

Table 5.20.2.7.3.4-2: Data structures supported by the DELETE Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.20.2.7.3.4-3: Data structures supported by the DELETE Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|--|---|-------------|------------------------|--|
| n/a | | | 204 No Content | Successful case. The concerned Individual MBS Parameters Provisioning resource is 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 clause 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 clause 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. | | | | |

Table 5.20.2.7.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 5.20.2.7.3.4-5: Headers supported by the 308 Response Code on this resource

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

5.20.2.7.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

5.20.3 Custom Operations without associated resources

There are no custom operations 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 clause 5.2.5 of 3GPP TS 29.122 [4].

Table 5.20.4.1-1: 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 URI 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 clause 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 clause 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 clause 5.2.5.4 of 3GPP TS 29.122 [4].

5.20.5 Data Model

5.20.5.1 General

This clause 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 | Clause defined | Description | Applicability |
|-----------------------|----------------|---|---------------|
| MbsPpData | 5.20.5.2.6 | Represents MBS Parameters Provisioning data. | |
| MbsPpDataPatch | 5.20.5.2.8 | Represents the requested modification to existing MBS Parameters Provisioning data. | |
| MbsSessAuthData | 5.20.5.2.7 | Represents the MBS Session Authorization data. | |
| MbsSessionCreateReq | 5.20.5.2.2 | Represents the parameters to request MBS Session creation. | |
| MbsSessionCreateResp | 5.20.5.2.3 | Represents the parameters to be returned in an MBS Session creation response. | |
| 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 |
|---------------------------|---------------------|---|---------------|
| 5MbsAuthorizationInfo | 3GPP TS 29.503 [17] | Contains the MBS Session authorization information. | |
| DateTime | 3GPP TS 29.122 [4] | Represents a date and a time | |
| ExternalGroupId | 3GPP TS 29.122 [4] | Represents the External Group Identifier for a user group. | |
| Gpsi | 3GPP TS 29.571 [8] | Represents a GPSI. | |
| MbsSession | 3GPP TS 29.571 [8] | Represents MBS session information. | |
| MbsSessionId | 3GPP TS 29.571 [8] | Represents the identifier of an MBS Session. | |
| PatchItem | 3GPP TS 29.571 [8] | Represents the requested modifications to a resource via the PATCH method. | |
| MbsSessionEventReportList | 3GPP TS 29.571 [8] | Represents the list of MBS Session Event Report(a). | |
| MbsSessionSubscription | 3GPP TS 29.571 [8] | Represents an MBS Session Subscription | |
| SupportedFeatures | 3GPP TS 29.571 [8] | Represents the list of supported feature(s) and used to negotiate the applicability of the optional features. | |
| Tmgi | 3GPP TS 29.571 [8] | Represents a TMGI. | |
| TunnelAddress | 3GPP TS 29.571 [8] | Represents a Tunnel Address (UDP/IP). | |
| Uri | 3GPP TS 29.122 [4] | Represents a URI. | |

5.20.5.2 Structured data types

5.20.5.2.1 Introduction

This clause 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. | |
| supFeat | SupportedFeatures | C | 0..1 | Contains the list of supported features. This attribute shall be provided in the HTTP POST request to create a new MBS session, if feature negotiation needs to take place. | |

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. | |
| eventList | MbsSessionEventReportList | C | 0..1 | Contains a list of MBS Session Status Event(s) report(s), if available. | |
| suppFeat | SupportedFeatures | C | 0..1 | Contains the list of supported features. This attribute shall be provided in the HTTP POST response to a request to create a new MBS session, if it was present in the corresponding HTTP POST request. | |

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 | Represents the parameters of the MBS Session Status subscription to be created | |
| subscriptionId | string | C | 0..1 | Contains the identifier of the created Individual MBS Session Subscription resource. This attribute shall only be present in the HTTP POST response to an MBS session creation request. | |

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 | Contains the reported MBS session event(s) and the related information. | |

5.20.5.2.6 Type: MbsPpData

Table 5.20.5.2.6-1: Definition of type MbsPpData

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|-----------------|-------------------|---|-------------|--|---------------|
| afId | string | M | 1 | Contains the identifier of the AF that is sending the request. | |
| mbsSessAuthData | MbsSessAuthData | C | 0..1 | Contains the MBS Session Authorization data that the AF requests to provision. This attribute shall be present when the AF request to provision MBS Session Authorization data. | |
| suppFeat | SupportedFeatures | C | 0..1 | Contains the list of supported features among the ones defined in clause 5.20.6. This attribute shall be provided when feature negotiation needs to take place. | |

5.20.5.2.7 Type: MbsSessAuthData

Table 5.20.5.2.7-1: Definition of type MbsSessAuthData

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|------------------|-----------------------|---|-------------|---|---------------|
| extGroupId | ExternalGroupId | M | 1 | Represents the external group identifier of the targeted multicast MBS Group. | |
| gpsiList | map(Gpsi) | C | 1..N | Represents the list of the GPSI(s) of the member UE(s) constituting the multicast MBS group. Any value of type string can be used as a key of the map. This attribute shall be present only if the multicast MBS group has not yet been created or the list of its member(s) needs to be updated. | |
| mbsSessionIdList | 5MbsAuthorizationInfo | M | 1 | Contains the identifier(s) of the multicast MBS Session(s) that the multicast MBS group is authorized to join. | |

5.20.5.2.8 Type: MbsPpDataPatch

Table 5.20.5.2.8-1: Definition of type MbsPpDataPatch

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|-----------------|-------------------|---|-------------|---|---------------|
| mbsSessAuthData | MbsSessAuthData | O | 0..1 | Contains the modified MBS Session Authorization data that the AF requests to provision. | |
| suppFeat | SupportedFeatures | O | 0..1 | Contains the modified list of supported features among the ones defined in clause 5.20.6. | |

5.20.5.3 Simple data types and enumerations

5.20.5.3.1 Introduction

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

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 clause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.20.6-1: Supported Features

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

5.20.7 Error handling

5.20.7.1 General

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

In addition, the requirements in the following clauses 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 failed due to transmission resources reservation failure. |
| INVALID_MBS_SERVICE_INFO | 400 Bad Request | The provided MBS Service Information is invalid (e.g. invalid QoS reference), incorrect or insufficient to perform MBS policy authorization. |
| FILTER_RESTRICTIONS_NOT_OBSERVED | 400 Bad Request | The MBS IP flow(s) description provided within the MBS Service Information cannot be handled due to the restrictions defined in clause 5.3.8 of 3GPP TS 29.214 [64] not being observed. |
| MBS_SERVICE_INFO_NOT_AUTHORIZED | 403 Forbidden | The provided MBS Service Information is rejected. |
| MBS_SESSION_ALREADY_CREATED | 403 Forbidden | The requested MBS session has already been created at the NEF/MB-SMF. |
| OVERLAPPING_MBS_SERVICE_AREA | 403 Forbidden | The provided MBS service area overlaps with the MBS service area of an existing MBS Session that shares the same MBS session Identifier. |
| UNKNOWN_TMGI | 404 Not Found | The TMGI provided in the request does not exist. |
| MBS_SESSION_CONTEXT_NOT_FOUND | 404 Not Found | The targeted Individual MBS Session does not exist. |
| UNKNOWN_MBS_SERVICE_AREA | 404 Not Found | The requested MBS service area (e.g. identified by the Area Session ID) cannot be found. |

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 clause 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 clauses below are defined relative to the above root URI.

This clause 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.

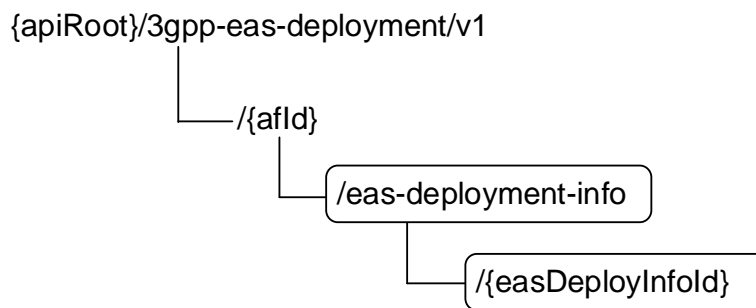


Figure 5.21.1.1-1: Resource URI structure of the northbound EASDeployment API

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 | /{afId}/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 | /{afId}/eas-deployment-info/{easDeployInfId} | 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 | Clause 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 clauses specify the resource methods supported by the resource as described in clause 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(EasDeployl nfo) | 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 clause 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 clause 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 header 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/{afId}/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/{afId}/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 | Clause 5.2.4 of 3GPP TS 29.122 [4]. |
| afld | string | Identifier of the AF. |
| easDeployInfold | 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 clauses specify the resource methods supported by the resource as described in clause 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 clause 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 clause 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 clause 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 clause 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 clause 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 clause 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

5.21.2.1 Overview

The structure of the custom operation URIs of the Nnef_EASDeployment service is shown in Figure 5.21.2.1-1.

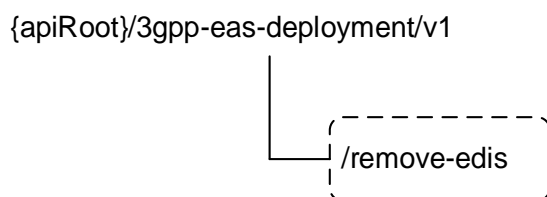
**Figure 5.21.2.1-1: Custom operation URI structure of the Nnef_EASDeployment API**

Table 5.21.2.1-1 provides an overview of the custom operations and applicable HTTP methods.

Table 5.21.2.1-1: Custom operations without associated resources

| Custom operation URI | Mapped HTTP method | Description |
|--|--------------------|---|
| {apiRoot}/3gpp-eas-deployment/<apiVersion>/remove-edis | POST | Request the NEF to delete EAS Deployment Information based on given attributes. |

5.21.2.2 Operation: remove-edis

5.21.2.2.1 Description

The operation is used by the NF service consumer to delete EAS Deployment Information based on given attributes.

5.21.2.2.2 Operation Definition

This operation shall support the request data structures shown in Table 5.21.2.2.2-1 and the response data structures and error codes specified in Table 5.21.2.2.2-2.

Table 5.21.2.2.2-1: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|-------------------|---|-------------|--|
| EdiDeleteCriteria | M | 1 | Information about the criteria to be used for EAS Deployment Information deletion. |

Table 5.21.2.2.2-2: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|-----------|---|-------------|----------------|--|
| n/a | | | 204 No Content | Successful request to remove EAS Deployment Information based on given criteria. |

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

5.21.3 Notifications

None.

5.21.4 Data Model

5.21.4.1 General

This clause 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 | Clause defined | Description | Applicability |
|---------------------|----------------|---|---------------|
| EasDeployInfo | 5.21.4.3.2 | EAS Deployment Information, indicates how edge services are deployed in each Local DN. | |
| EdiDeleteCriteria | 5.21.4.3.5 | Contains criteria for deleting EAS Deployment Information. | |
| 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 |
|-------------------------|--------------------|---|
| Afld | 5.14.5.4.2 | Represents an AF identifier. |
| Dnai | 3GPP TS 29.571 [8] | Identifies a DNAI. |
| Dnn | 3GPP TS 29.571 [8] | Identifies a DNN. |
| DnnSnssaiInformation | 5.18.3.3.5 | Contains DNN and S-NSSAI information. |
| ExternalGroupId | 3GPP TS 29.122 [4] | External Group Identifier for a user group. |
| FqdnPatternMatchingRule | 3GPP TS 29.571 [8] | Identifies the FQDN pattern matching rule. |
| 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. | |
| fqdnPatternList | array(FqdnPatternMatchingRule) | M | 1..N | Supported FQDN pattern(s) for application(s) deployed in the Local part of the DN where each FQDN pattern is described by a FQDN Pattern Matching Rule. | |
| 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. | |
| dnailInfos | 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 5.21.4.3.3-1: Definition of type DnailInformation

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|----------------------------|---|-------------|--|---------------|
| dnai | Dnai | M | 1 | Identifier the DNAI. | |
| dnsServIds | array(DnsServerIdentifier) | C | 1..N | list of DNS server identifier (consisting of IP address and port) for each DNAI. | |
| easIpAddrs | array(IpAddr) | C | 1..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 5.21.4.3.4-1: 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. | |

5.21.4.3.5 Type: EdiDeleteCriteria

Table 5.21.4.3.5-1: Definition of type EdiDeleteCriteria

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|----------------|----------------------|---|-------------|--|---------------|
| afld | Afld | C | 0..1 | AF identifier to be used as deletion criterion. (NOTE) | |
| dnnSnssai | DnnSnssaiInformation | C | 0..1 | DNN and S-NSSAI information to be used as deletion criterion. (NOTE) | |

NOTE: At least one of those attributes shall be provided.

5.21.4.4 Simple data types and enumerations

5.21.4.4.1 Introduction

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

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 |
|-----------|-----------------|-------------|---------------|
| | | | |

5.21.5 Used Features

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

Table 5.21.5-1: Features used by EASDeployment API

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

5.21.6 Error handling

5.21.6.1 General

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

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

5.21.6.2 Protocol Errors

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

5.21.6.3 Application Errors

The application errors defined for EASDeployment API are listed in table 5.21.6.3-1.

Table 5.21.6.3-1: Application errors

| Application Error | HTTP status code | Description | Applicability |
|-------------------|------------------|-------------|---------------|
| | | | |

5.22 ASTI API

5.22.1 Resources

5.22.1.1 Overview

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

{apiRoot}/3gpp-asti/v1

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

This clause describes the structure for the Resource URIs as shown in figure 5.22.1.1-1 and the resources and HTTP methods used for the ASTI API.

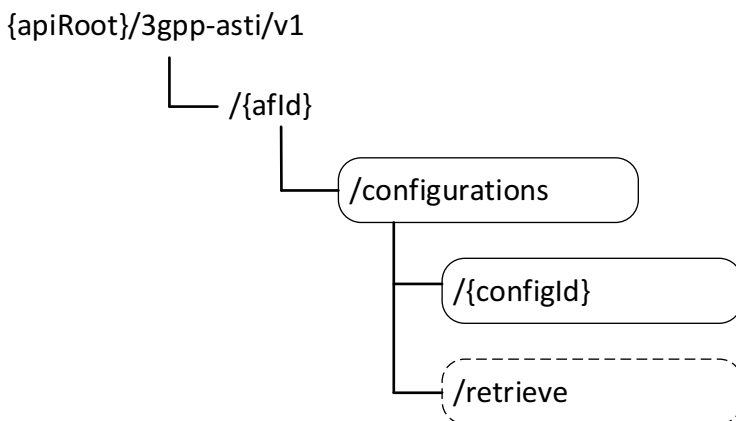


Figure 5.22.1.1-1: Resource URI structure of the ASTI API

Table 5.22.1.1-1 provides an overview of the resources and HTTP methods applicable for the ASTI API.

Table 5.22.1.1-1: Resources and methods overview

| Resource name | Resource URI | HTTP method | Description |
|-------------------------------|-----------------------------------|-----------------|---|
| ASTI Configurations | /{afld}/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. |
| | /{afld}/configurations/retrieve | retrieve (POST) | Retrieval of the status of access stratum time distribution. |
| Individual ASTI Configuration | /{afld}/configurations/{configId} | PUT | Modify a configuration configuration of 5G access stratum time distribution. |
| | | DELETE | Delete a configuration of 5G access stratum time distribution. |
| | | GET | Query the status of the access time distribution |

5.22.1.2 Resource: ASTI Configurations

5.22.1.2.1 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.

5.22.1.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-asti/v1/{afld}/configurations**

This resource shall support the resource URI variables defined in table 5.22.1.2.2-1.

Table 5.22.1.2.2-1: Resource URI variables for this resource

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

5.22.1.2.3 Resource Methods

5.22.1.2.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 5.22.1.2.2.

5.22.1.2.3.2 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 5.22.1.2.3.2-1.

Table 5.22.1.2.3.2-1: 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 5.22.1.2.3.2-2 and the response data structures and response codes specified in table 5.22.1.2.3.2-3.

Table 5.22.1.2.3.2-2: Data structures supported by the GET Request Body on this resource

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

Table 5.22.1.2.3.2-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|--|---|-------------|------------------------|--|
| array(AccessTimeDistributionData) | M | 0..N | 200 OK | The configuration information 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 clause 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 clause 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 5.22.1.2.3.2-4: 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 5.22.1.2.3.2-5: 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. |

5.22.1.2.3.3 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 5.22.1.2.3.3-1 and the response data structures and response codes specified in table 5.22.1.2.3.3-2.

Table 5.22.1.2.3.3-1: 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 5.22.1.2.3.3-2: 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 5.22.1.2.3.3-3: 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-asti/v1/{afId}/configurations/{configId} |

5.22.1.2.4 Resource Custom Operations

5.22.1.2.4.1 Overview

Table 5.22.1.2.4.1-1: Custom operations

| Operation Name | Custom operation URI | Mapped HTTP method | Description |
|----------------|--------------------------|--------------------|--|
| retrieve | /configurations/retrieve | retrieve (POST) | Request the status of the 5G access stratum time distribution for a list of UEs. |

5.22.1.2.4.2 Operation: retrieve

5.22.1.2.4.2.1 Description

This custom operation retrieves the status of the access stratum time distribution for a list of UEs.

5.22.1.2.4.2.2 Operation Definition

This operation shall support the request data structures specified in table 5.22.1.2.4.2.2-1 and the response data structure and response codes specified in table 5.22.1.2.4.2.2-2.

Table 5.22.1.2.4.2.2-1: 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 5.22.1.2.4.2.2-2: 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. | | | | |

5.22.1.3 Resource: Individual ASTI Configuration

5.22.1.3.1 Introduction

This resource allows an AF to read/modify/cancel a configuration of 5G access stratum time distribution with the NEF.

5.22.1.3.2 Resource Definition

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

This resource shall support the resource URI variables defined in table 5.22.1.3.2-1.

Table 5.22.1.3.2-1: Resource URI variables for this resource

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

5.22.1.3.3 Resource Methods

5.22.1.3.3.1 General

The following clauses specify the resource methods supported by the resource as described in clause 5.22.1.3.2.

5.22.1.3.3.2 GET

The GET method allows to read the active configuration for a given AF 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 5.22.1.3.3.2-1.

Table 5.22.1.3.3.2-1: 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 5.22.1.3.3.2-2 and the response data structures and response codes specified in table 5.22.1.3.3.2-3.

Table 5.22.1.3.3.2-2: Data structures supported by the GET Request Body on this resource

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

Table 5.22.1.3.3.2-3: 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 clause 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 clause 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 5.22.1.3.3.2-4: 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 5.22.1.3.3.2-5: 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. |

5.22.1.3.3.3 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 5.22.1.3.3.3-1 and the response data structures and response codes specified in table 5.22.1.3.3.3-2.

Table 5.22.1.3.3.3-1: 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 5.22.1.3.3.3-2: 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 clause 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 clause 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 5.22.1.3.3.3-3: 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 5.22.1.3.3.3-4: 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. |

5.22.1.3.3.4 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 5.22.1.3.3.4-1.

Table 5.22.1.3.3.4-1: 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 5.22.1.3.3.4-2 and the response data structures and response codes specified in table 5.22.1.3.3.4-3.

Table 5.22.1.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

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

Table 5.22.1.3.3.4-3: 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 clause 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 clause 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 5.22.1.3.3.4-4: 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 5.22.1.3.3.4-5: 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. |

5.22.2 Custom Operations without associated resources

None.

5.22.3 Notifications

None.

5.22.4 Data Model

5.22.4.1 General

This clause specifies the application data model supported by the ASTI API.

Table 5.22.4.1-1 specifies the data types defined for the ASTI API.

Table 5.22.4.1-1: ASTI API specific Data Types

| Data type | Clause defined | Description | Applicability |
|----------------------------|----------------|---|---------------|
| AccessTimeDistributionData | 5.22.4.3.2 | Contains the parameters for the creation of 5G access stratum time distribution configuration. | |
| ActiveUe | 5.22.4.3.5 | Contains the UE identifier whose status of the access stratum time distribution is active and the optional requested time synchronization error budget. | |
| StatusRequestData | 5.22.4.3.3 | Contains the parameters for retrieval of the status of the access stratum time distribution for a list of UEs. | |
| StatusResponseData | 5.22.4.3.4 | Contains the parameters for the status of the access stratum time distribution for a list of UEs. | |

5.22.4.2 Reused data types

The data types reused by the TimeSyncExposure API from other specifications are listed in table 5.22.4.2-1.

Table 5.22.4.2-1: Re-used Data Types

| Data type | Reference | Comments |
|-------------------------|---------------------|---|
| AsTimeDistributionParam | 3GPP TS 29.565 [50] | Contains the 5G access stratum time distribution parameters. |
| ExternalGroupId | 3GPP TS 29.122 [4] | External Group Identifier for a user group. |
| 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 5.22.5-1. |

5.22.4.3 Structured data types

5.22.4.3.1 Introduction

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

5.22.4.3.2 Type: AccessTimeDistributionData

Table 5.22.4.3.2-1: 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) | |
| exterGroupI d | ExternalGroupI d | C | 0.1 | Represents a group of users. (NOTE) | |
| asTimeDisParam | AsTimeDistrib utionParam | M | 1 | 5G access stratum time distribution parameters | |
| suppFeat | SupportedFeatu res | 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: One of "gpsis" or "externalGroupI" attribute shall be provided. | | | | | |

5.22.4.3.3 Type: StatusRequestData

Table 5.22.4.3.3-1: Definition of type StatusRequestData

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|----------------|-------------|---|-------------|-----------------------------|---------------|
| gpsis | array(Gpsi) | M | 1..N | Identifies a list of UE(s). | |

5.22.4.3.4 Type: StatusResponseData

Table 5.22.4.3.4-1: 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. | |

5.22.4.3.5 Type: ActiveUe

Table 5.22.4.3.5-1: 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. | |

5.22.4.4 Simple data types and enumerations

5.22.4.4.1 Introduction

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

5.22.4.4.2 Simple data types

The simple data types defined in table 5.22.4.4.2-1 shall be supported.

Table 5.22.4.4.2-1: Simple data types

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

5.22.5 Used Features

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

Table 5.22.5-1: Features used by ASTI API

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

5.22.6 Error handling

5.22.6.1 General

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

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

5.22.6.2 Protocol Errors

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

5.22.6.3 Application Errors

The application errors defined for the ASTI API are listed in table 5.22.6.3-1.

Table 5.22.6.3-1: Application errors

| Application Error | HTTP status code | Description |
|-------------------|------------------|-------------|
| | | |

5.23 DataReporting API

5.23.1 Introduction

The Nnef_DataReporting service shall use the DataReporting API.

The API URI of DataReporting API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 5.2.4 of 3GPP TS 29.122 [2], i.e.:

{apiRoot}/<apiName>/<apiVersion>/<apiSpecificSuffixes>

with the following components:

- "apiRoot" is set as defined in clause 5.2.4 of 3GPP TS 29.122 [4].
- "apiName" shall be set to "3gpp-data-reporting".
- "apiVersion" shall be set to "v1" for the current version defined in the present document.

All resource URIs in the clauses below are defined relative to the above API URI.

5.23.2 Resources

This clause describes the structure for the Resource URIs as shown in Figure 5.23.2-1 and the resources and HTTP methods used for the DataReporting API.

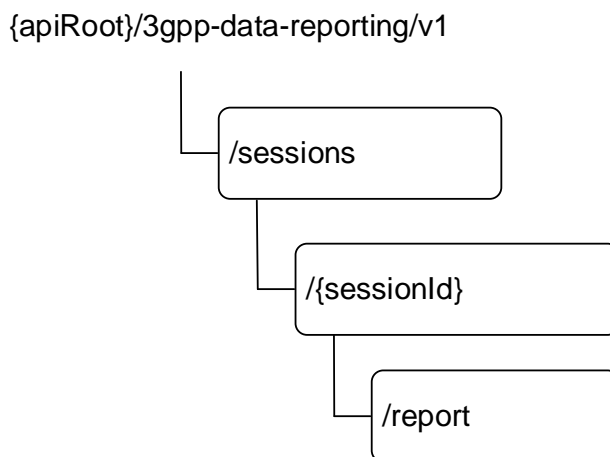


Figure 5.23.2-1: Resource URI structure of the DataReporting API

Table 5.23.2-1 provides an overview of the resources and applicable HTTP methods.

Table 5.23.2-1: Resources and methods overview

| Resource name | Resource URI (relative path under API URI) | HTTP method or custom operation | Description (service operation) |
|-----------------------------------|--|---------------------------------|--|
| Data Reporting Sessions | /sessions | POST | Create a Data Reporting Session |
| Individual Data Reporting Session | /sessions/{sessionId} | GET | Retrieve an existing Individual Data Reporting Session resource. |
| | | PUT | Update an Individual existing Data Reporting Session resource. |
| | | DELETE | Delete an existing Individual Data Reporting Session resource. |
| | | report (POST) | Report data. |

5.23.2.2 Resource: Data Reporting Sessions

5.23.2.2.1 Introduction

This resource represents the collection of Data Reporting Sessions managed by the NEF.

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [3]).

5.23.2.2.2 Resource definition

Resource URL: **{apiRoot}/3gpp-data-reporting/v1/sessions**

This resource shall support the resource URL variables defined in table 5.23.2.2.2-1.

Table 5.23.2.2.2-1: Resource URL variables for this resource

| Name | Data type | Definition |
|---------|-----------|---------------------|
| apiRoot | string | See clause 5.213.1. |

5.23.2.2.3 Resource Methods

5.23.2.2.3.1 POST

This method enables an AF to request the creation of a Data Reporting Session at the NEF.

This method shall support the URI query parameters specified in table 5.23.2.2.3.1-1.

Table 5.23.2.2.3.1-1: 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 5.23.2.2.3.1-2 and the response data structures and response codes specified in table 5.23.2.2.3.1-4.

Table 5.23.2.2.3.1-2: Data structures supported by the POST request body on this resource

| Data type | P | Cardinality | Description |
|--|---|-------------|--|
| DataReportingSession (NOTE) | M | 1 | Representation of the Data Reporting Session to be created in the NEF. |
| NOTE: The "sessionId" attribute of the DataReportingSession data type shall not be provided as it is not applicable. | | | |

Table 5.23.2.2.3.1-3: Data structures supported by the POST response body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|----------------|---|
| DataReportingSession (NOTE 2) | M | 1 | 201 Created | Successful case. A representation of the created Individual Data Reporting Session resource is returned. The URI of the created resource shall be returned in an HTTP "Location" header. |
| 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: The "sessionId" attribute of the DataReportingSession data type shall not be provided as it is not applicable. | | | | |

Table 5.23.2.2.3.1-4: Headers supported by the 201 response code on this resource

| HTTP response header | Data type | P | Cardinality | Description |
|----------------------|-----------|---|-------------|--|
| Location | string | M | 1 | The URI of the newly created resource, according to the structure: {apiRoot}/3gpp-data-reporting/v1/sessions/{sessionId} |

5.23.2.3 Resource: Individual Data Reporting Session

5.23.2.3.1 Introduction

This resource represents an Individual Data Reporting Session managed by the NEF.

This resource is modelled with the Document resource archetype (see clause C.1 of 3GPP TS 29.501 [3]).

5.23.2.3.2 Resource Definition

Resource URL: {apiRoot}/3gpp-data-reporting/v1/sessions/{sessionId}

This resource shall support the resource URI variables defined in table 5.23.2.3.2-1.

Table 5.23.2.3.2-1: Resource URL variables for this resource

| Name | Data type | Definition |
|-----------|-----------|---|
| apiRoot | string | See clause 5.23.1 |
| sessionId | string | Represents the identifier of the Individual Data Reporting Sessions resource. |

5.23.2.3.3 Resource standard methods

5.23.2.3.3.1 GET

This method enables an AF to retrieve an existing Individual Data Reporting Session resource at the NEF.

This method shall support the URI query parameters specified in table 5.23.2.3.3.1-1.

Table 5.23.2.3.3.1-1: 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 5.23.2.3.3.1-2 and the response data structures and response codes specified in table 5.23.2.3.3.1-3.

Table 5.23.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.23.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| DataReportingSession | M | 1 | 200 OK | Successful case. The requested Individual Data Reporting Session resource is returned to the 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE 1: 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. | | | | |
| NOTE 2: The "sessionId" attribute of the DataReportingSession data type shall not be provided as it is not applicable. | | | | |

Table 5.23.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.23.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.23.2.3.3.2 PUT

This method enables an AF to update an existing Individual Data Reporting Session resource at the NEF.

This method shall support the URI query parameters specified in table 5.23.2.3.3.2-1.

Table 5.23.2.3.3.2-1: URI query parameters supported by the PUT method on this resource

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| | | | | |

This method shall support the request data structures specified in table 5.23.2.3.3.2-2 and the response data structures and response codes specified in table 5.23.2.3.3.2-4.

Table 5.23.2.3.3.2-2: Data structures supported by the PUT request body on this resource

| Data type | P | Cardinality | Description |
|--|---|-------------|--|
| DataReportingSession | M | 1 | Parameters to update the Individual Data Reporting Session resource. |
| NOTE: The "sessionId" attribute of the DataReportingSession data type shall not be provided as it is not applicable. | | | |

Table 5.23.2.3.3.2-3: Data structures supported by the PUT response body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| DataReportingSession | M | 1 | 200 OK | The Individual Data Reporting Session resource was updated successfully and a representation of the created resource is returned in the response body. |
| n/a | | | 204 No Content | The Individual Data Reporting Session resource was successfully updated and no content is to be returned in the response body. |
| 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE 1: The mandatory HTTP error status code for the PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. | | | | |
| NOTE 2: The "sessionId" attribute of the DataReportingSession data type shall not be provided as it is not applicable. | | | | |

Table 5.23.2.3.3.2-4: 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 5.23.2.3.3.2-5: 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. |

5.23.2.3.3.3 DELETE

This method enables an AF to request the deletion of an Individual Data Reporting Session resource at the NEF.

This method shall support the URI query parameters specified in table 5.23.2.3.3.3-1.

Table 5.23.2.3.3.3-1: 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 5.23.2.3.3.3-2 and the response data structures and response codes specified in table 5.23.2.3.3.3-3.

Table 5.23.2.3.3.3-2: Data structures supported by the DELETE request body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.23.2.3.3.3-3: 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 Data Reporting 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 clause 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 clause 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.

Table 5.23.2.3.3.3-4: 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 in an alternative NEF. |

Table 5.23.2.3.3.3-5: 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 in an alternative NEF. |

5.23.2.3.4 Resource custom operations

5.23.2.3.4.1 Overview

Table 5.23.2.3.4.1-1: Custom operations

| Operation name | Custom operation URI | Mapped HTTP method | Description |
|----------------|------------------------------|--------------------|--|
| Report | /sessions/{sessionId}/report | POST | Enables to send collected UE data reports. |

5.23.2.3.4.2 Operation: Report

5.23.2.3.4.2.1 Description

The custom operation enables an AF to send collected UE data reports to the NEF.

5.23.2.3.4.2.2 Operation Definition

This operation shall support the request data structures specified in table 5.23.2.3.4.2.2-1 and the response data structures and response codes specified in table 5.23.2.3.4.2.2-2.

Table 5.23.2.3.4.2.2-1: Data structures supported by the POST request body on this resource

| Data type | P | Cardinality | Description |
|------------|---|-------------|---|
| DataReport | M | 1 | UE data reported by the data collection client. |

Table 5.23.2.3.4.2.2-2: Data structures supported by the POST response body on this resource

| Data type | P | Cardinality | Response codes | Description |
|--|---|-------------|------------------------|--|
| DataReportingSession | O | 0..1 | 200 OK | The UE data report was successfully received. |
| 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4] |
| NOTE 1: 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. | | | | |
| NOTE 2: The "sessionId" attribute of the DataReportingSession data type shall not be provided as it is not applicable. | | | | |

Table 5.23.2.3.4.2.2-3: 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 5.23.2.3.4.2.2-4: 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. |

5.23.3 Custom Operations without associated resources

There are no custom operations without associated resources defined for this API in this release of the specification.

5.23.4 Notifications

There are no notifications defined for this API in this release of the specification.

5.23.5 Data Model

5.23.3.1 General

This clause specifies the application data model supported by the DataReporting API. Table 5.23.5.1-1 specifies the data types defined for the DataReporting API.

Table 5.23.5.1-1: DataReporting specific Data Types

| Data type | Clause defined | Description |
|-----------|----------------|-------------|
| n/a | | |

Table 5.23.5.1-2 specifies data types re-used by the DataReporting API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the DataReporting API.

Table 5.23.5.1-2: Re-used Data Types

| Data type | Reference | Comments | Applicability |
|----------------------|---------------------|---|---------------|
| DataReport | 3GPP TS 26.532 [60] | Reported data by the AF. | |
| DataReportingSession | 3GPP TS 26.532 [60] | Configuration by the AF specifying the data to be reported. | |

5.23.6 Used Features

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

Table 5.23.6-1: Features used by DataReporting API

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

5.23.7 Error handling

5.23.7.1 General

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

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

5.23.7.2 Protocol Errors

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

5.23.7.3 Application Errors

The application errors defined for the DataReporting API are listed in table 5.23.7.3-1.

Table 5.23.7.3-1: Application errors

| Application Error | HTTP status code | Description |
|-------------------|------------------|-------------|
| | | |

5.24 DataReportingProvisioning API

5.24.1 Introduction

The Nnef_DataReportingProvisioning service shall use the DataReportingProvisioning API.

The API URI of the DataReportingProvisioning API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 5.2.4 of 3GPP TS 29.122 [4], i.e.:

{apiRoot}/<apiName>/<apiVersion>/<apiSpecificSuffixes>

with the following components:

- "apiRoot" is set as defined in clause 5.2.4 of 3GPP TS 29.122 [4].
- "apiName" shall be set to "3gpp-data-reporting-provisioning".
- "apiVersion" shall be set to "v1" for the current version defined in the present document.

All resource URIs in the clauses below are defined relative to the above API URI.

5.24.2 Resources

This clause describes the structure for the Resource URIs as shown in Figure 5.24.2-1 and the resources and HTTP methods used for the DataReportingProvisioning API.

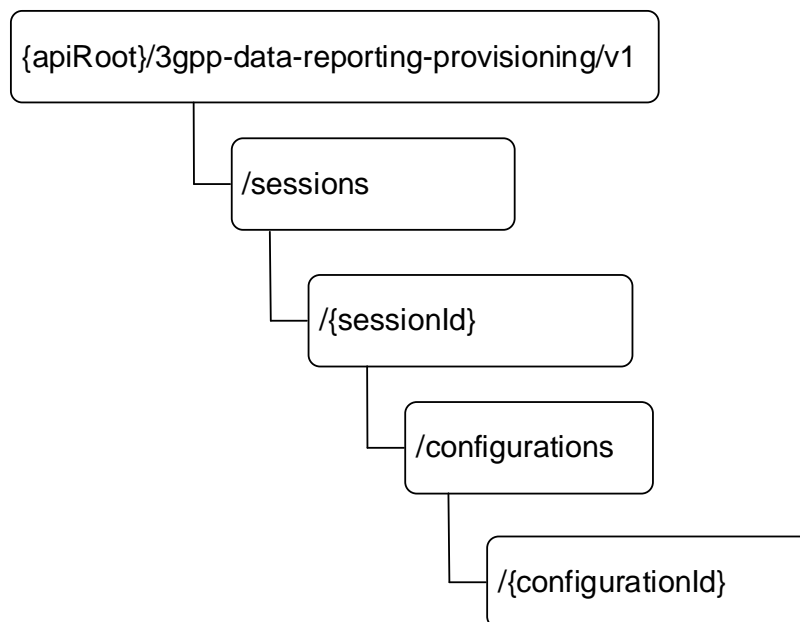


Figure 5.24.2-1: Resource URI structure of the DataReportingProvisioning API

Table 5.24.2-1 provides an overview of the resources and applicable HTTP methods.

Table 5.24.2-1: Resources and methods overview

| Resource name | Resource URI (relative path under API URI) | HTTP method | Description (service operation) |
|--|--|-------------|---|
| Data Reporting Provisioning Sessions | /sessions | POST | Create a Data Reporting Provisioning Session. |
| Individual Data Reporting Provisioning Session | /sessions/{sessionId} | GET | Retrieve an existing Individual Data Reporting Provisioning Session resource. |
| | | DELETE | Delete an existing Individual Data Reporting Provisioning Session resource. |
| Data Reporting Configuration | /sessions/{sessionId}/configurations | POST | Create a new Data Reporting Configuration. |
| Individual Data Reporting Configuration | /sessions/{sessionId}/configurations/{configurationId} | GET | Retrieves an existing individual Data Reporting Configuration resource. |
| | | PUT | Update an existing individual Data Reporting Configuration resource. |
| | | PATCH | Modify an existing Individual Data Reporting Configuration resource. |
| | | DELETE | Delete an existing Individual Data Reporting Configuration resource. |

5.24.2.2 Resource: Data Reporting Provisioning Sessions

5.24.2.2.1 Introduction

This resource represents the collection of Data Reporting Provisioning Sessions managed by the NEF.

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [3]).

5.24.2.2.2 Resource definition

Resource URL: **{apiRoot}/3gpp-data-reporting-provisioning/v1/sessions**

This resource shall support the resource URI variables defined in table 5.24.2.2.2-1.

Table 5.24.2.2-1: Resource URL variables for this resource

| Name | Data type | Definition |
|---------|-----------|--------------------|
| apiRoot | string | See clause 5.24.1. |

5.24.2.2.3 Resource Methods

5.24.2.2.3.1 POST

This method enables an AF to request the creation of a Data Reporting Provisioning Session at the NEF.

This method shall support the URI query parameters specified in table 5.24.2.2.3.1-1.

Table 5.24.2.2.3.1-1: 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 5.24.2.2.3.1-2 and the response data structures and response codes specified in table 5.24.2.2.3.1-4.

Table 5.24.2.2.3.1-2: Data structures supported by the POST request body on this resource

| Data type | P | Cardinality | Description |
|--|---|-------------|--|
| DataReportingProvisioningSession (NOTE) | M | 1 | Representation of the Individual Data Reporting Provisioning Session to be created in the NEF. |
| NOTE: The "provisioningSessionId" attribute of the DataReportingProvisioningSession data type shall not be provided as it is not applicable. | | | |

Table 5.24.2.2.3.1-3: Data structures supported by the POST response body on this resource

| Data type | P | Cardinality | Response codes | Description |
|--|---|-------------|----------------|--|
| DataReportingProvisioningSession (NOTE 2) | M | 1 | 201 Created | Successful case. A representation of the created Individual Data Reporting Provisioning Session resource is returned. The URI of the created resource shall be returned in an HTTP "Location" header. |
| 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: The "provisioningSessionId" attribute of the DataReportingProvisioningSession data type shall not be provided as it is not applicable. | | | | |

Table 5.24.2.2.3.1-4: Headers supported by the 201 response code on this resource

| HTTP response header | Data type | P | Cardinality | Description |
|----------------------|-----------|---|-------------|---|
| Location | string | M | 1 | The URI of the newly created resource, according to the structure: {apiRoot}/3gpp-data-reporting-provisioning/v1/sessions/{sessionId} |

5.24.2.3 Resource: Individual Data Reporting Provisioning Session

5.24.2.3.1 Introduction

This resource represents an Individual Data Reporting Provisioning Session managed by the NEF.

This resource is modelled with the Document resource archetype (see clause C.1 of 3GPP TS 29.501 [3]).

5.24.2.3.2 Resource Definition

Resource URL: {apiRoot}/3gpp-data-reporting-provisioning/v1/sessions/{sessionId}

This resource shall support the resource URI variables defined in table 5.24.2.3.2-1.

Table 5.24.2.3.2-1: Resource URL variables for this resource

| Name | Data type | Definition |
|-----------|-----------|---|
| apiRoot | string | See clause 5.24.1 |
| sessionId | string | Represents the identifier of the Individual Data Reporting Provisioning Session resource. |

5.24.2.3.3 Resource standard methods

5.24.2.3.3.1 GET This method enables an AF to retrieve an existing Individual Data Reporting Provisioning Session resource at the NEF.

This method shall support the URI query parameters specified in table 5.24.2.3.3.1-1.

Table 5.24.2.3.3.1-1: 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 5.24.2.3.3.1-2 and the response data structures and response codes specified in table 5.24.2.3.3.1-3.

Table 5.24.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.24.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|--|---|-------------|------------------------|---|
| DataReportingProvisioningSession (NOTE 2) | M | 1 | 200 OK | Successful case. The requested Individual Data Reporting Provisioning Session resource is returned to the 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE 1: 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. | | | | |
| NOTE 2: The "provisioningSessionId" attribute of the DataReportingProvisioningSession data type shall not be provided as it is not applicable. | | | | |

Table 5.24.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.24.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.24.2.3.3.2 Void

5.24.2.3.3.3 DELETE

This method enables an AF to request the deletion of an existing Individual Data Reporting Provisioning Session resource at the NEF.

This method shall support the URI query parameters specified in table 5.24.2.3.3.3-1.

Table 5.24.2.3.3.3-1: 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 5.24.2.3.3.3-2 and the response data structures and response codes specified in table 5.24.2.3.3.3-3.

Table 5.24.2.3.3.3-2: Data structures supported by the DELETE request body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.24.2.3.3.3-3: 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 Data Reporting Provisioning 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 clause 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 clause 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. | | | | |

Table 5.24.2.3.3.3-4: 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. |

Table 5.24.2.3.3.3-5: 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. |

5.24.2.4 Resource: Data Reporting Configurations

5.24.2.4.1 Introduction

This resource represents the collection of Data Reporting Configurations managed by the NEF.

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [3]).

5.24.2.4.2 Resource definition

Resource URL: **{apiRoot}/3gpp-data-reporting-provisioning/v1/sessions/{sessionId}/configurations**

This resource shall support the resource URI variables defined in table 5.24.2.4.2-1.

Table 5.24.2.4.2-1: Resource URL variables for this resource

| Name | Data type | Definition |
|-----------|-----------|---|
| apiRoot | string | See clause 5.24.1. |
| sessionId | string | Represents the identifier of the existing Data Reporting Provisioning Session resource. |

5.24.2.4.3 Resource Methods

5.24.2.4.3.1 POST

This method enables an AF to request the creation of a Data Reporting Configuration at the NEF.

This method shall support the URI query parameters specified in table 5.24.2.4.3.1-1.

Table 5.24.2.4.3.1-1: 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 5.24.2.4.3.1-2 and the response data structures and response codes specified in table 5.24.2.4.3.1-4.

Table 5.24.2.4.3.1-2: Data structures supported by the POST request body on this resource

| Data type | P | Cardinality | Description |
|---|---|-------------|--|
| DataReportingConfiguration (NOTE) | M | 1 | Representation of the Data Reporting Configuration to be created in the NEF. |
| NOTE: The "dataReportingConfigurationId" attribute of the DataReportingConfiguration data type shall not be provided as it is not applicable. | | | |

Table 5.24.2.4.3.1-3: Data structures supported by the POST response body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|----------------|---|
| DataReportingConfiguration (NOTE 2) | M | 1 | 201 Created | Successful case. A representation of the created Individual Data Reporting Configuration resource is returned. The URI of the created resource shall be returned in an HTTP "Location" header. |
| 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: The "dataReportingConfigurationId" attribute of the DataReportingConfiguration data type shall not be provided as it is not applicable. | | | | |

Table 5.24.2.4.3.1-4: Headers supported by the 201 response code on this resource

| HTTP response header | Data type | P | Cardinality | Description |
|----------------------|-----------|---|-------------|--|
| Location | string | M | 1 | The URI of the newly created resource, according to the structure: {apiRoot}/3gpp-data-reporting-provisioning/v1/sessions/{sessionId}/configurations |

Table 5.24.2.4.3.1-5: 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 5.24.2.4.3.1-6: 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. |

5.24.2.5 Resource: Individual Data Reporting Configuration

5.24.2.5.1 Introduction

This resource represents an Individual Data Reporting Configuration resource managed by the NEF.

This resource is modelled with the Document resource archetype (see clause C.1 of 3GPP TS 29.501 [3]).

5.24.2.5.2 Resource Definition

Resource URL: **{apiRoot}/3gpp-data-reporting-provisioning/v1/sessions/{sessionId}/configurations/{configurationId}**

This resource shall support the resource URI variables defined in table 5.24.2.5.2-1.

Table 5.24.2.5.2-1: Resource URL variables for this resource

| Name | Data type | Definition |
|-----------------|-----------|---|
| apiRoot | string | See clause 5.24.1 |
| sessionId | string | Represents the identifier of the Individual Data Reporting Provisioning Session resource. |
| configurationId | string | Represents the identifier of the Individual Data Reporting Configuration resource. |

5.24.2.5.3 Resource standard methods

5.24.2.5.3.2 GET

This method enables an AF to retrieve an existing Individual Data Reporting Configuration resource at the NEF.

This method shall support the URI query parameters specified in table 5.24.2.5.3.2-1.

Table 5.24.2.5.3.2-1: 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 5.24.2.5.3.2-2 and the response data structures and response codes specified in table 5.24.2.5.3.2-3.

Table 5.24.2.5.3.2-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.24.2.5.3.2-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| DataReportingConfiguration (NOTE 2) | M | 1 | 200 OK | Successful case. The requested Individual Data Reporting Configuration resource is returned to the 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE 1: 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. | | | | |
| NOTE 2: The "dataReportingConfigurationId" attribute of the DataReportingConfiguration data type shall not be provided as it is not applicable. | | | | |

Table 5.24.2.5.3.2-4: 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 5.24.2.5.3.2-5: 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. |

5.24.2.5.3.3 PUT

This method enables an AF to update an existing Individual Data Reporting Configuration resource at the NEF.

This method shall support the URI query parameters specified in table 5.24.2.5.3.3-1.

Table 5.24.2.5.3.3-1: URI query parameters supported by the PUT method on this resource

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| | | | | |

This method shall support the request data structures specified in table 5.24.2.5.3.3-2 and the response data structures and response codes specified in table 5.24.2.5.3.3-3.

Table 5.24.2.5.3.3-2: Data structures supported by the PUT request body on this resource

| Data type | P | Cardinality | Description |
|---|---|-------------|--|
| DataReportingConfiguration (NOTE) | M | 1 | Parameters to update the Individual Data Reporting Configuration resource. |
| NOTE: The "dataReportingConfigurationId" attribute of the DataReportingConfiguration data type shall not be provided as it is not applicable. | | | |

Table 5.24.2.5.3.3-3: Data structures supported by the PUT response body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| DataReportingConfiguration (NOTE 2) | M | 1 | 200 OK | The Individual Data Reporting Configuration resource was updated successfully and a representation of the updated resource is returned in the response body. |
| n/a | | | 204 No Content | The Individual Data Reporting Configuration resource was successfully updated and no content is to be returned in the response body. |
| 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE 1: The mandatory HTTP error status code for the PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. | | | | |
| NOTE 2: The "dataReportingConfigurationId" attribute of the DataReportingConfiguration data type shall not be provided as it is not applicable. | | | | |

Table 5.24.2.5.3.3-4: 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 5.24.2.5.3.3-5: 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. |

5.24.2.5.3.3A PATCH

The PATCH method is used to modify an existing Individual Data Reporting Configuration resource.

This method shall support the request data structures specified in table 5.24.2.5.3.3A-1, and the response data structures and response codes specified in table 5.24.2.5.3.3A-2.

Table 5.24.2.5.3.3A-1: Data structures supported by the PATCH request body on this resource

| Data type | P | Cardinality | Description |
|---------------------------------|---|-------------|---|
| DataReportingConfigurationPatch | M | 1 | Parameters to modify for a Data Reporting Configuration resource. |

Table 5.24.2.5.3.3A-2: Data structures supported by the PATCH response body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| DataReportingConfiguration (NOTE 2) | M | 1 | 200 OK | The Data Reporting Configuration resource was updated successfully by configuration data provided. |
| n/a | | | 204 No Content | The Data Reporting Configuration resource was successfully updated and no content is to be returned in the response body. |
| 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 clause 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 clause 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. | | | | |
| NOTE 2: The "dataReportingConfigurationId" attribute of the DataReportingConfiguration data type shall not be provided as it is not applicable. | | | | |

Table 5.24.2.5.3.3A-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 5.24.2.5.3.3A-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. |

5.24.2.5.3.4 DELETE

This method enables an AF to request the deletion of an existing Individual Data Reporting Configuration resource at the NEF.

This method shall support the URI query parameters specified in table 5.24.2.5.3.4-1.

Table 5.24.2.5.3.4-1: 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 5.24.2.5.3.4-2 and the response data structures and response codes specified in table 5.24.2.5.3.4-3.

Table 5.24.2.5.3.4-2: Data structures supported by the DELETE request body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.24.2.5.3.4-3: Data structures supported by the DELETE response body on this resource

| Data type | P | Cardinality | Response Codes | Description |
|-----------|---|-------------|------------------------|--|
| n/a | | | 204 No Content | Successful response. The Data Reporting Configuration 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 clause 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 clause 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.

Table 5.24.2.5.3.4-4: 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 5.24.2.5.3.4-5: 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. |

5.24.3 Custom Operations without associated resources

There are no custom operations without associated resources defined for this API in this release of the specification.

5.24.4 Notifications

There are no notifications defined for this API in this release of the specification.

5.24.5 Data Model

5.24.5.1 General

This subclause specifies the application data model supported by the DataReportingProvisioning API. Table 5.24.5.1-1 specifies the data types defined for the DataReportingProvisioning API.

Table 5.24.5.1-1: DataReportingProvisioning specific Data Types

| Data type | Clause defined | Description |
|-----------|----------------|-------------|
| n/a | | |

Table 5.24.5.1-2 specifies data types re-used by the DataReportingProvisioning API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the DataReportingProvisioning API.

Table 5.24.5.1-2: DataReportingProvisioning re-used Data Types

| Data type | Reference | Comments | Applicability |
|----------------------------------|---------------------|--|---------------|
| DataReportingProvisioningSession | 3GPP TS 26.532 [60] | Configuration by the AF specifying the data to be collected, processed and reported. | |
| DataReportingConfiguration | 3GPP TS 26.532 [60] | Configuration data related to UE data collection and reporting. | |
| DataReportingConfigurationPatch | 3GPP TS 26.532 [60] | Contains the requested modifications to the configuration data regarding UE data collection and reporting. | |

5.24.6 Used Features

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

Table 5.24.6-1: Features used by DataReportingProvisioning API

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

5.24.7 Error handling

5.24.7.1 General

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

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

5.24.7.2 Protocol Errors

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

5.24.7.3 Application Errors

The application errors defined for the DataReportingProvisioning API are listed in table 5.24.7.3-1.

Table 5.24.7.3-1: Application errors

| Application Error | HTTP status code | Description |
|-------------------|------------------|-------------|
| | | |

5.25 UEId API

5.25.1 Introduction

The Nnef_UEId service shall use the UEId API.

The API URI of UEId API shall be:

{apiRoot}/3gpp-ucid/v1

with the following components:

- "apiRoot" is set as described in clause 5.2.4 in 3GPP TS 29.122 [4].

- "apiName" shall be set to "3gpp-ueid".
- "apiVersion" shall be set to "v1" for the current version defined in the present document.

All resource URIs in the clauses below are defined relative to the above root URI.

5.25.2 Resources

There are no resources defined for this API in this release of the specification.

5.25.3 Custom Operations without associated resources

5.25.3.1 Overview

The structure of the custom operation URIs of the UEId API is shown in Figure 5.25.3.1-1.

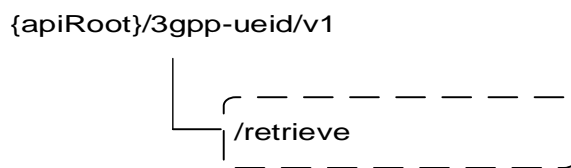


Figure 5.25.3.1-1: Custom operation URI structure of the UEId API

Table 5.25.3.1-1 provides an overview of the custom operations and applicable HTTP methods.

Table 5.25.3.1-1: Custom operations without associated resources

| Operation name | Custom operation URI | Mapped HTTP method | Description |
|----------------|----------------------|--------------------|--|
| Retrieve | /retrieve | POST | Request to retrieve AF specific UE ID information. |

5.25.3.2 Operation: Retrieve

5.25.3.2.1 Description

The custom operation allows a service consumer to retrieve AF specific UE ID information via the NEF.

5.25.3.2.2 Operation Definition

This operation shall support the request and response data structures and response codes specified in table 5.25.3.2.2-1 and table 5.25.3.2.2-2.

Table 5.25.3.2.2-1: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|--|
| UeidReq | M | 1 | Parameters to request to retrieve AF specific UE ID information. |

Table 5.25.3.2.2-2: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| UeIdInfo | M | 1 | 200 OK | The requested AF specific UE ID information was returned successfully. |
| ProblemDetails | O | 0..1 | 403 Forbidden | If the AF request is not authorized, the NEF shall respond with "403 Forbidden". |
| ProblemDetails | O | 0..1 | 404 Not Found | If the requested UE ID does not exist or not available in the subscription, the NEF shall respond with "404 Not Found". |
| 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 clause 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 clause 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 5.25.3.2.2-3: 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 5.25.3.2.2-4: 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. |

5.25.4 Notifications

There are no Notifications defined for this API in this release of the specification.

5.25.5 Data Model

5.25.5.1 General

This clause specifies the application data model supported by the UEId API. Table 5.25.5.1-1 specifies the data types defined for the UEId API.

Table 5.25.5.1-1: UEId service specific Data Types

| Data type | Clause defined | Description | Applicability |
|-----------|----------------|--|---------------|
| UeIdReq | 5.25.5.2.2 | Represents the parameters to requestAF specific UE ID retrieval. | |
| UeIdInfo | 5.25.5.2.3 | Represents AF specific UE ID information. | |

Table 5.25.5.1-2 specifies data types re-used by the UEId API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the UEId API.

Table 5.25.5.1-2: Re-used Data Types

| Data type | Reference | Comments |
|------------------------|--------------------|-------------------------------------|
| Dnn | 3GPP TS 29.571 [8] | Identifies a DNN. |
| ExternalId | 3GPP TS 29.122 [4] | Represents an External Identifier. |
| IpAddr | 3GPP TS 29.571 [8] | Identifies an IP address. |
| MacAddr48 | 3GPP TS 29.571 [8] | Identifies a MAC address. |
| MtcProviderInformation | 3GPP TS 29.571 [8] | Indicates MTC provider information. |
| Port | 3GPP TS 29.122 [4] | Identifies an application port ID. |
| Snssai | 3GPP TS 29.571 [8] | Identifies the S-NSSAI. |
| UInteger | 3GPP TS 29.571 [8] | Represents a unsigned integer. |

5.25.5.2 Structured data types

5.25.5.2.1 Introduction

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

5.25.5.2.2 Type: UeldReq

Table 5.25.5.2.2-1: Definition of type UeldReq

| Attribute name | Data type | P | Cardinality | Description | Applicability (NOTE 1) |
|---|------------------------|---|-------------|---|------------------------|
| afId | string | M | 1 | Represents the identifier of the AF that is sending the request. | |
| appPortId | Port | O | 0..1 | Identifies an application port ID. See clause 9.2.3.24.4 of 3GPP TS 23.040 [62] for further details. | |
| dnn | Dnn | O | 0..1 | Identifies a DNN. | |
| ipDomain | string | O | 0..1 | The IPv4 address domain identifier. The attribute may only be present if the IPv4 address is provided in the "ueIpAddr" attribute. | |
| mtcProviderId | MtcProviderInformation | O | 0..1 | Indicates MTC provider information. | |
| snssai | Snssai | O | 0..1 | Identifies an S-NSSAI. | |
| ueIpAddr | IpAddr | C | 0..1 | Identifies a UE IP Address. (NOTE 2) | |
| ueMacAddr | MacAddr48 | C | 0..1 | Identifies a UE MAC Address. (NOTE 2) | |
| NOTE 1: Properties marked with a feature as defined in clause 5.25.6 are applicable as described in clause 5.2.7 of 3GPP TS 29.122 [4]. If no feature is indicated, the related property is always applied. | | | | | |
| NOTE 2: One of the "ueIpAddr" attribute or "ueMacAddr" attribute shall be included. | | | | | |

5.25.5.2.3 Type: UeldInfo

Table 5.25.5.2.3-1: Definition of type UeldInfo

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|----------------|------------|---|-------------|---|---------------|
| externalId | ExternalId | M | 1 | Contains the AF specific UE ID in the form of an external identifier uniquely identifying the user. | |

5.25.5.3 Simple data types and enumerations

5.25.5.3.1 Introduction

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

5.25.5.3.2 Simple data types

The simple data types defined in table 5.25.5.3.2-1 shall be supported.

Table 5.25.5.3.2-1: Simple data types

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

5.25.6 Used Features

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

Table 5.25.6-1: Features used by UEId API

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

5.25.7 Error handling

5.25.7.1 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.

5.25.7.2 Protocol Errors

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

5.25.7.3 Application Errors

The application errors defined for the UEId API are listed in table 5.25.7.3-1.

Table 5.25.7.3-1: Application errors

| Application Error | HTTP status code | Description |
|------------------------|------------------|--|
| REQUEST_NOT_AUTHORIZED | 403 Forbidden | Indicates that the request is not authorized. |
| UE_ID_NOT_AVAILABLE | 404 Not Found | Indicates that the requested AF specific UE ID is not available. |
| UE_NOT_FOUND | 404 Not Found | Indicates that the requested UE address is not found. |

5.26 MBSUserService API

5.26.1 Introduction

The Nnef_MBSUserService service shall use the MBSUserService API.

The API URI of MBSUserService API shall be:

{apiRoot}/3gpp-mbs-us/v1

with the following components:

- "apiRoot" is set as defined in clause 5.2.4 of 3GPP TS 29.122 [4].
- "apiName" shall be set to "3gpp-mbs-us".
- "apiVersion" shall be set to "v1" for the current version defined in the present document.

All resource URIs in the clauses below are defined relative to the above root URI.

5.26.2 Resources

5.26.2.1 Overview

This clause describes the structure for the Resource URIs as shown in figure 5.26.2.1-1 and the resources and HTTP methods used for the MBSUserService API.

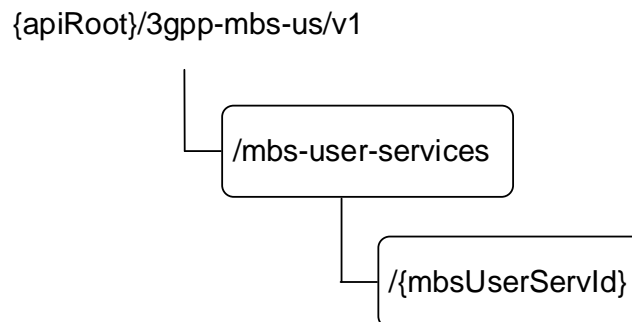


Figure 5.26.2.1-1: Resource URI structure of the MBSUserService API

Table 5.26.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.26.2.1-1: Resources and methods overview

| Resource name | Resource URI (relative path under API URI) | HTTP method or custom operation | Description (service operation) |
|-----------------------------|--|---------------------------------|---|
| MBS User Services | /mbs-user-services | GET | Retrieve all the active MBS User Services managed by the NEF. |
| | | POST | Request the creation of a new MBS User Service. |
| Individual MBS User Service | /mbs-user-services/{mbsUserServId} | GET | Retrieve an existng MBS User Service managed by the NEF. |
| | | PUT | Update an existng MBS User Service managed by the NEF. |
| | | PATCH | Modify an existng MBS User Service managed by the NEF. |
| | | DELETE | Delete an existng MBS User Service managed by the NEF. |

5.26.2.2 Resource: MBS User Services

5.26.2.2.1 Introduction

This resource represents the collection of MBS User Services managed by the NEF.

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [3]).

5.26.2.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-mbs-us/v1/mbs-user-services

This resource shall support the resource URI variables defined in table 5.26.2.2.2-1.

Table 5.26.2.2.2-1: Resource URI variables for this resource

| Name | Data type | Definition |
|---------|-----------|--------------------|
| apiRoot | string | See clause 5.26.1. |

5.26.2.2.3 Resource Standard Methods

5.26.2.2.3.1 GET

This method allows an AF to retrieve all the active MBS User Service resources at the NEF.

This method shall support the URI query parameters specified in table 5.26.2.2.3.1-1.

Table 5.26.2.2.3.1-1: 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 5.26.2.2.3.1-2 and the response data structures and response codes specified in table 5.26.2.2.3.1-3.

Table 5.26.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.26.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| array(MBSUserService) | M | 0..N | 200 OK | Successful case. All the active MBS User Services 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 clause 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 clause 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. | | | | |

Table 5.26.2.2.3.1-4: 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 5.26.2.2.3.1-5: 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. |

5.26.2.2.3.2 POST

This method enables an AF to request the creation of an MBS User Service resource at the NEF.

This method shall support the URI query parameters specified in table 5.26.2.2.3.2-1.

Table 5.26.2.2.3.2-1: 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 5.26.2.2.3.2-2 and the response data structures and response codes specified in table 5.26.2.2.3.2-3.

Table 5.26.2.2.3.2-2: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|----------------|---|-------------|---|
| MBSUserService | M | 1 | Contains the parameters to request the creation of a new MBS User Service at the NEF. |

Table 5.26.2.2.3.2-3: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|--|---|-------------|----------------|---|
| MBSUserService | M | 1 | 201 Created | Successful case. A new MBS User Service is successfully created and a representation of the created Individual MBS User Service resource is returned. An HTTP "Location" header that contains the resource URI of the created Individual MBS User Service resource shall also be included. |
| 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 5.26.2.2.3.2-4: 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-us/v1/mbs-user-services/{mbsUserServId} |

5.26.2.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

5.26.2.3 Resource: Individual MBS User Service

5.26.2.3.1 Introduction

This resource represents an Individual MBS User Service managed by the NEF.

This resource is modelled with the Document resource archetype (see clause C.1 of 3GPP TS 29.501 [3]).

5.26.2.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-mbs-us/v1/mbs-user-services/{mbsUserServId}

This resource shall support the resource URI variables defined in table 5.26.2.3.2-1.

Table 5.26.2.3.2-1: Resource URI variables for this resource

| Name | Data type | Definition |
|---------------|-----------|---|
| apiRoot | string | See clause 5.26.1. |
| mbsUserServId | string | Contains the unique identifier of the Individual MBS User Service resource assigned by the NEF. |

5.26.2.3.3 Resource Standard Methods

5.26.2.3.3.1 GET

This method allows an AF to retrieve an existing Individual MBS User Service resource at the NEF.

This method shall support the URI query parameters specified in table 5.26.2.3.3.1-1.

Table 5.26.2.3.3.1-1: 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 5.26.2.3.3.1-2 and the response data structures and response codes specified in table 5.26.2.3.3.1-3.

Table 5.26.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.26.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| MBSUserService | M | 1 | 200 OK | Successful case. The requested Individual MBS User Service resource is successfully 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 clause 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 clause 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. | | | | |

Table 5.26.2.3.3.1-4: 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 5.26.2.3.3.1-5: 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. |

5.26.2.3.3.2 PUT

This method enables an AF to request the update of an existing Individual MBS User Service resource at the NEF.

This method shall support the URI query parameters specified in table 5.26.2.3.3.2-1.

Table 5.26.2.3.3.2-1: 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 5.26.2.3.3.2-2 and the response data structures and response codes specified in table 5.26.2.3.3.2-3.

Table 5.26.2.3.3.2-2: Data structures supported by the PUT Request Body on this resource

| Data type | P | Cardinality | Description |
|----------------|---|-------------|--|
| MBSUserService | M | 1 | Contains the updated representation of the Individual MBS User Service resource that is to be updated. |

Table 5.26.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|----------------|---|-------------|------------------------|--|
| MBSUserService | M | 1 | 200 OK | Successful case. The concerned Individual MBS User Service resource is successfully updated and a representation of the updated resource is returned in the response body. |
| n/a | | | 204 No Content | Successful case. The concerned Individual MBS User Service resource is successfully updated and no content is returned in the response body. |
| 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |

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

Table 5.26.2.3.3.2-4: 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 5.26.2.3.3.2-5: 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. |

5.26.2.3.3.3 PATCH

This method enables an AF to request the modification of an existing Individual MBS User Service resource at the NEF.

This method shall support the URI query parameters specified in table 5.26.2.3.3.3-1.

Table 5.26.2.3.3.3-1: 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 5.26.2.3.3.3-2 and the response data structures and response codes specified in table 5.26.2.3.3.3-3.

Table 5.26.2.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

| Data type | P | Cardinality | Description |
|---------------------|---|-------------|--|
| MBSUserServicePatch | M | 1 | Contains the parameters to request the modification of the Individual MBS User Service resource. |

Table 5.26.2.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| MBSUserService | M | 1 | 200 OK | Successful case. The concerned Individual MBS User Service resource is successfully modified and a representation of the updated resource is returned in the response body. |
| n/a | | | 204 No Content | Successful response. The Individual MBS User Service resource was successfully modified and no content is returned in the response body. |
| 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: 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. | | | | |

Table 5.26.2.3.3.3-4: 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 in an alternative NEF. |

Table 5.26.2.3.3.3-5: 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 in an alternative NEF. |

5.26.2.3.3.4 DELETE

This method enables an AF to request the deletion of an existing Individual MBS User Service resource at the NEF.

This method shall support the URI query parameters specified in table 5.26.2.3.3.4-1.

Table 5.26.2.3.3.4-1: 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 5.26.2.3.3.4-2 and the response data structures and response codes specified in table 5.26.2.3.3.4-3.

Table 5.26.2.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.26.2.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

| Data type | P | Cardinality | Response Codes | Description |
|--|---|-------------|------------------------|--|
| n/a | | | 204 No Content | Successful response. The Individual MBS User Service resource is 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 clause 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 clause 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. | | | | |

Table 5.26.2.3.3.4-4: 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 5.26.2.3.3.4-5: 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. |

5.26.2.3.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

5.26.3 Custom Operations without associated resources

There are no custom operations without associated resources defined for this API in this release of the specification.

5.26.4 Notifications

There are no notifications defined for this API in this release of the specification.

5.26.5 Data Model

5.26.5.1 General

This clause specifies the application data model supported by the MBSUserService API. Table 5.26.5.1-1 specifies the data types defined for the MBSUserService API.

Table 5.26.5.1-1: MBSUserService specific Data Types

| Data type | Clause defined | Description | Applicability |
|-----------|----------------|-------------|---------------|
| | | | |

Table 5.26.5.1-2 specifies data types re-used by the MBSUserService API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the MBSUserService API.

Table 5.26.5.1-2: Re-used Data Types

| Data type | Reference | Comments | Applicability |
|---------------------|---------------------|--|---------------|
| MBSUserService | 3GPP TS 29.580 [66] | Represents MBS User Service parameters. | |
| MBSUserServicePatch | 3GPP TS 29.580 [66] | Represents the requested modifications to an MBS User Service resource representation. | |

5.26.5.2 Structured data types

5.26.5.2.1 Introduction

This clause defines the structures to be used in resource representations.

There are no structured data types defined for this API in this release of the specification.

5.26.5.3 Simple data types and enumerations

5.26.5.3.1 Introduction

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

5.26.5.3.2 Simple data types

The simple data types defined in table 5.26.5.3.2-1 shall be supported.

Table 5.26.5.3.2-1: Simple data types

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

5.26.6 Used Features

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

Table 5.26.6-1: Features used by MBSUserService API

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

5.26.7 Error handling

5.26.7.1 General

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

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

5.26.7.2 Protocol Errors

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

5.26.7.3 Application Errors

The application errors defined for the MBSUserService API are listed in table 5.26.7.3-1.

Table 5.26.7.3-1: Application errors

| Application Error | HTTP status code | Description |
|-------------------|------------------|-------------|
| | | |

5.27 MBSUserDataIngestSession API

5.27.1 Introduction

The Nnef_MBSUserDataIngestSession service shall use the MBSUserDataIngestSession API.

The API URI of MBSUserDataIngestSession API shall be:

{apiRoot}/3gpp-mbs-ud-ingest/v1

with the following components:

- "apiRoot" is set as defined in clause 5.2.4 of 3GPP TS 29.122 [4].
- "apiName" shall be set to "3gpp-mbs-ud-ingest".
- "apiVersion" shall be set to "v1" for the current version defined in the present document.

All resource URIs in the clauses below are defined relative to the above root URI.

5.27.2 Resources

5.27.2.1 Overview

This clause describes the structure for the Resource URIs as shown in figure 5.27.2.1-1 and the resources and HTTP methods used for the MBSUserDataIngestSession API.

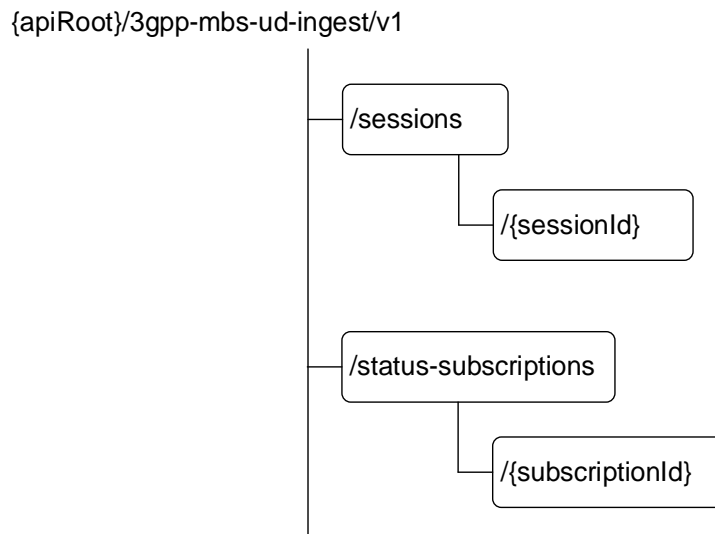


Figure 5.27.2.1-1: Resource URI structure of the MBSUserDataIngestSession API

Table 5.27.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.27.2.1-1: Resources and methods overview

| Resource name | Resource URI (relative path under API URI) | HTTP method or custom operation | Description (service operation) |
|---|--|---------------------------------|---|
| MBS User Data Ingest Sessions | /sessions | GET | Retrieve all the active MBS User Data Ingest Sessions managed by the NEF. |
| | | POST | Request the creation of a new MBS User Data Ingest Session. |
| Individual MBS User Data Ingest Session | /sessions/{sessionId} | GET | Retrieve an existing Individual MBS User Data Ingest Session managed by the NEF. |
| | | PUT | Update an existing Individual MBS User Data Ingest Session managed by the NEF. |
| | | PATCH | Modify an existing Individual MBS User Data Ingest Session managed by the NEF. |
| | | DELETE | Delete an existing Individual MBS User Data Ingest Session managed by the NEF. |
| MBS User Data Ingest Session Status Subscriptions | /status-subscriptions | GET | Retrieve all the active MBS User Data Ingest Session Status Subscriptions managed by the NEF. |
| | | POST | Request the creation of a new MBS User Data Ingest Session Status Subscription. |

| | | | |
|---|--|--------|--|
| Individual MBS User Data Ingest Session Status Subscription | /status-subscriptions/{subscriptionId} | GET | Retrieve an existing Individual MBS User Data Ingest Session Status Subscription managed by the NEF. |
| | | PUT | Update an existing MBS User Data Ingest Session Status Subscription managed by the NEF. |
| | | PATCH | Modify an existing MBS User Data Ingest Session Status Subscription managed by the NEF. |
| | | DELETE | Delete an existing Individual MBS User Data Ingest Session Status Subscription managed by the NEF. |

5.27.2.2 Resource: MBS User Data Ingest Sessions

5.27.2.2.1 Introduction

This resource represents the collection of MBS User Data Ingest Sessions managed by the NEF.

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [3]).

5.27.2.2.2 Resource Definition

Resource URI: {apiRoot}/3gpp-mbs-ud-ingest/v1/sessions

This resource shall support the resource URI variables defined in table 5.27.2.2.2-1.

Table 5.27.2.2.2-1: Resource URI variables for this resource

| Name | Data type | Definition |
|---------|-----------|--------------------|
| apiRoot | string | See clause 5.27.1. |

5.27.2.2.3 Resource Standard Methods

5.27.2.2.3.1 GET

This method allows an AF to retrieve all the active MBS User Data Ingest Sessions managed by the NEF.

This method shall support the URI query parameters specified in table 5.27.2.2.3.1-1.

Table 5.27.2.2.3.1-1: 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 5.27.2.2.3.1-2 and the response data structures and response codes specified in table 5.27.2.2.3.1-3.

Table 5.27.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.27.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|---|
| array(MBSUserDataIngSession) | M | 0..N | 200 OK | Successful case. All the active MBS User Data Ingest Sessions managed by the NEF are returned. |
| 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 clause 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 clause 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. | | | | |

Table 5.27.2.2.3.1-4: 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 5.27.2.2.3.1-5: 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. |

5.27.2.2.3.2 POST

This method enables an AF to request the creation of an MBS User Data Ingest Session at the NEF.

This method shall support the URI query parameters specified in table 5.27.2.2.3.2-1.

Table 5.27.2.2.3.2-1: 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 5.27.2.2.3.2-2 and the response data structures and response codes specified in table 5.27.2.2.3.2-3.

Table 5.27.2.2.3.2-2: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------------------|---|-------------|---|
| MBSUserDataIngSession | M | 1 | Contains the parameters to request the creation of a new MBS User Data Ingest Session at the NEF. |

Table 5.27.2.2.3.2-3: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response Codes | Description |
|--|---|-------------|----------------|--|
| MBSUserDataIngestSession | M | 1 | 201 Created | Successful case. A new MBS User Data Ingest Session is successfully created and a representation of the created Individual MBS User Data Ingest Session resource is returned. An HTTP "Location" header that contains the URI of the created Individual MBS User Data Ingest Session resource is also included. |
| 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 5.27.2.2.3.2-4: 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-ud-ingest/v1/sessions/{sessionId} |

5.27.2.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

5.27.2.3 Resource: Individual MBS User Data Ingest Session

5.27.2.3.1 Introduction

This resource represents an Individual MBS User Data Ingest Session resource managed by the NEF.

This resource is modelled with the Document resource archetype (see clause C.1 of 3GPP TS 29.501 [3]).

5.27.2.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-mbs-ud-ingest/v1/sessions/{sessionId}

This resource shall support the resource URI variables defined in table 5.27.2.3.2-1.

Table 5.27.2.3.2-1: Resource URI variables for this resource

| Name | Data type | Definition |
|-----------|-----------|---|
| apiRoot | string | See clause 5.27.1. |
| sessionId | string | Contains the unique identifier of the Individual MBS User Data Ingest Session resource assigned by the NEF. |

5.27.2.3.3 Resource Standard Methods

5.27.2.3.3.1 GET

This method allows an AF to retrieve an existing "Individual MBS User Data Ingest Session" resource at the NEF.

This method shall support the URI query parameters specified in table 5.27.2.3.3.1-1.

Table 5.27.2.3.3.1-1: 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 5.27.2.3.3.1-2 and the response data structures and response codes specified in table 5.27.2.3.3.1-3.

Table 5.27.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.27.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| MBSUserDataIngSession | M | 1 | 200 OK | Successful case. The requested Individual MBS User Data Ingest Session resource is successfully 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 clause 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 clause 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. | | | | |

Table 5.27.2.3.3.1-4: 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 5.27.2.3.3.1-5: 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. |

5.27.2.3.3.2 PUT

This method enables an AF to request the update of an existing "Individual MBS User Data Ingest Session" resource at the NEF.

This method shall support the URI query parameters specified in table 5.27.2.3.3.2-1.

Table 5.27.2.3.3.2-1: 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 5.27.2.3.3.2-2 and the response data structures and response codes specified in table 5.27.2.3.3.2-3.

Table 5.27.2.3.3.2-2: Data structures supported by the PUT Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------------------|---|-------------|--|
| MBSUserDataIngSession | M | 1 | Contains the updated representation of the Individual MBS User Data Ingest Session resource that is to be updated. |

Table 5.27.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| MBSUserDataIngSession | M | 1 | 200 OK | Successful case. The concerned Individual MBS User Data Ingest Session resource is successfully updated and a representation of the updated resource is returned in the response body. |
| n/a | | | 204 No Content | Successful case. The concerned Individual MBS User Data Ingest Session resource is successfully updated and no content is returned in the response body. |
| 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status code for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. | | | | |

Table 5.27.2.3.3.2-4: 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 5.27.2.3.3.2-5: 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. |

5.27.2.3.3.3 PATCH

This method enables an AF to request the modification of an existing "Individual MBS User Data Ingest Session" resource at the NEF.

This method shall support the URI query parameters specified in table 5.27.2.3.3.3-1.

Table 5.27.2.3.3.3-1: 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 5.27.2.3.3.3-2 and the response data structures and response codes specified in table 5.27.2.3.3.3-3.

Table 5.27.2.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

| Data type | P | Cardinality | Description |
|----------------------------|---|-------------|--|
| MBSUserDataIngSessionPatch | M | 1 | Contains the parameters to request the modification of the Individual MBS User Data Ingest Session resource. |

Table 5.27.2.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| MBSUserDataIngSession | M | 1 | 200 OK | Successful case. The concerned Individual MBS User Data Ingest Session resource is successfully modified and a representation of the updated resource is returned in the response body. |
| n/a | | | 204 No Content | Successful response. The Individual MBS User Data Ingest Session resource is successfully modified and no content is returned in the response body. |
| 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: 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. | | | | |

Table 5.27.2.3.3.3-4: 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 in an alternative NEF. |

Table 5.27.2.3.3.3-5: 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 in an alternative NEF. |

5.27.2.3.3.4 DELETE

This method enables an AF to request the deletion of an existing "Individual MBS User Data Ingest Session" resource at the NEF.

This method shall support the URI query parameters specified in table 5.27.2.3.3.4-1.

Table 5.27.2.3.3.4-1: 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 5.27.2.3.3.4-2 and the response data structures and response codes specified in table 5.27.2.3.3.4-3.

Table 5.27.2.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.27.2.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

| Data type | P | Cardinality | Response Codes | Description |
|--|---|-------------|------------------------|--|
| n/a | | | 204 No Content | Successful response. The Individual MBS User Data Ingest Session resource is 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 clause 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 clause 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. | | | | |

Table 5.27.2.3.3.4-4: 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 5.27.2.3.3.4-5: 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. |

5.27.2.3.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

5.27.2.4 Resource: MBS User Data Ingest Session Status Subscriptions

5.27.2.4.1 Introduction

This resource represents the collection of MBS User Data Ingest Session Status Subscriptions managed by the NEF.

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [3]).

5.27.2.4.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-mbs-ud-ingest/v1/status-subscriptions**

This resource shall support the resource URI variables defined in table 5.27.2.4.2-1.

Table 5.27.2.4.2-1: Resource URI variables for this resource

| Name | Data type | Definition |
|---------|-----------|--------------------|
| apiRoot | string | See clause 5.27.1. |

5.27.2.4.3 Resource Standard Methods

5.27.2.4.3.1 GET

This method allows an AF to retrieve all the active MBS User Data Ingest Session Status Subscriptions managed by the NEF.

This method shall support the URI query parameters specified in table 5.27.2.4.3.1-1.

Table 5.27.2.4.3.1-1: 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 5.27.2.4.3.1-2 and the response data structures and response codes specified in table 5.27.2.4.3.1-3.

Table 5.27.2.4.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.27.2.4.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| array(MBSUserDataIngestStatSubsc) | M | 0..N | 200 OK | Successful case. All the active MBS User Data Ingest Session Status Subscriptions managed by the NEF are returned. |
| 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 clause 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 clause 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. | | | | |

Table 5.27.2.4.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.27.2.4.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.27.2.4.3.2 POST

This method enables an AF to request the creation of a new MBS User Data Ingest Session Status Subscription at the NEF.

This method shall support the URI query parameters specified in table 5.27.2.4.3.2-1.

Table 5.27.2.4.3.2-1: 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 5.27.2.4.3.2-2 and the response data structures and response codes specified in table 5.27.2.4.3.2-3.

Table 5.27.2.4.3.2-2: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|-------------------------|---|-------------|---|
| MBSUserDataIngStatSubsc | M | 1 | Contains the parameters to request the creation of a new MBS User Data Ingest Session Status Subscription at the NEF. |

Table 5.27.2.4.3.2-3: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response Codes | Description |
|--|---|-------------|----------------|--|
| MBSUserDataIngStatSubsc | M | 1 | 201 Created | Successful case. A new MBS User Data Ingest Session Status Subscription is successfully created and a representation of the created Individual MBS User Data Ingest Session Status Subscription resource is returned. An HTTP "Location" header that contains the URI of the created Individual MBS User Data Ingest Session Status Subscription resource is also included. |
| 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 5.27.2.4.3.2-4: 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-ud-ingest/v1/status-subscriptions/{subscriptionId} |

5.27.2.4.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

5.27.2.5 Resource: Individual MBS User Data Ingest Session Status Subscription

5.27.2.5.1 Introduction

This resource represents an Individual MBS User Data Ingest Session Status Subscription managed by the NEF.

This resource is modelled with the Document resource archetype (see clause C.1 of 3GPP TS 29.501 [3]).

5.27.2.5.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-mbs-ud-ingest/v1/status-subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 5.27.2.5.2-1.

Table 5.27.2.5.2-1: Resource URI variables for this resource

| Name | Data type | Definition |
|-----------|-----------|---|
| apiRoot | string | See clause 5.27.1. |
| sessionId | string | Contains the unique identifier of the Individual MBS User Data Ingest Session Status Subscription resource assigned by the NEF. |

5.27.2.5.3 Resource Standard Methods

5.27.2.5.3.1 GET

This method allows an AF to retrieve an existing "Individual MBS User Data Ingest Session Status Subscription" resource at the NEF.

This method shall support the URI query parameters specified in table 5.27.2.5.3.1-1.

Table 5.27.2.5.3.1-1: 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 5.27.2.5.3.1-2 and the response data structures and response codes specified in table 5.27.2.5.3.1-3.

Table 5.27.2.5.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.27.2.5.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| MBSUserDataIngStatSubsc | M | 1 | 200 OK | Successful case. The requested Individual MBS User Data Ingest Session Status Subscription resource is successfully 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 clause 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 clause 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. | | | | |

Table 5.27.2.5.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 5.27.2.5.3.1-5: Headers supported by the 308 Response Code on this resource

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

5.27.2.5.3.2 PUT

The PATCH method allows an AF to update an existing "Individual MBS User Data Ingest Session Status Subscription" resource managed by the NEF.

This method shall support the URI query parameters specified in table 5.27.2.5.3.2-1.

Table 5.27.2.5.3.2-1: 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 5.27.2.5.3.2-2 and the response data structures and response codes specified in table 5.27.2.5.3.2-3.

Table 5.27.2.5.3.2-2: Data structures supported by the PUT Request Body on this resource

| Data type | P | Cardinality | Description |
|-------------------------|---|-------------|--|
| MBSUserDataIngStatSubsc | M | 1 | Contains the parameters to request the modification of an existing "Individual MBS User Data Ingest Session Status Subscription" resource. |

Table 5.27.2.5.3.2-3: Data structures supported by the PUT Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|---|
| MBSUserDataIngStat Subsc | M | 1 | 200 OK | Successful case. The concerned "Individual MBS User Data Ingest Session Status Subscription" resource is successfully updated and a representation of the updated resource is returned in the response body. |
| n/a | | | 204 No Content | Successful case. The concerned "Individual MBS User Data Ingest Session Status Subscription" resource is successfully updated, and no content is returned in the response body. |
| 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status code for the PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. | | | | |

Table 5.27.2.5.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 5.27.2.5.3.2-5: Headers supported by the 308 Response Code on this resource

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

5.27.2.5.3.3 PATCH

The PATCH method allows an AF to modify an existing "Individual MBS User Data Ingest Session Status Subscription" resource managed by the NEF.

This method shall support the URI query parameters specified in table 5.27.2.5.3.3-1.

Table 5.27.2.5.3.3-1: 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 5.27.2.5.3.3-2 and the response data structures and response codes specified in table 5.27.2.5.3.3-3.

Table 5.27.2.5.3.3-2: Data structures supported by the PATCH Request Body on this resource

| Data type | P | Cardinality | Description |
|------------------------------|---|-------------|--|
| MBSUserDataIngStatSubscPatch | M | 1 | Contains the parameters to request the modification of an existing "Individual MBS User Data Ingest Session Status Subscription" resource. |

Table 5.27.2.5.3.3-3: Data structures supported by the PATCH Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|---|
| MBSUserDataIngStat Subsc | M | 1 | 200 OK | Successful case. The concerned "Individual MBS User Data Ingest Session Status Subscription" resource is successfully modified, and a representation of the updated resource is returned in the response body. |
| n/a | | | 204 No Content | Successful case. The concerned "Individual MBS User Data Ingest Session Status Subscription" resource is successfully modified and no content is returned in the response body. |
| 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: 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. | | | | |

Table 5.27.2.5.3.3-4: 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 5.27.2.5.3.3-5: 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. |

5.27.2.5.3.4 DELETE

This method enables an AF to request the deletion of an existing Individual MBS User Data Ingest Session Status Subscription resource at the NEF.

This method shall support the URI query parameters specified in table 5.27.2.5.3.4-1.

Table 5.27.2.5.3.4-1: 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 5.27.2.5.3.4-2 and the response data structures and response codes specified in table 5.27.2.5.3.4-3.

Table 5.27.2.5.3.4-2: Data structures supported by the DELETE Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.27.2.5.3.4-3: Data structures supported by the DELETE Response Body on this resource

| Data type | P | Cardinality | Response Codes | Description |
|-----------|---|-------------|------------------------|--|
| n/a | | | 204 No Content | Successful response. The Individual MBS User Data Ingest Session Status Subscription resource is 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 clause 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 clause 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.

Table 5.27.2.5.3.4-4: 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 5.27.2.5.3.4-5: 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. |

5.27.2.5.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

5.27.3 Custom Operations without associated resources

There are no custom operations without associated resources defined for this API in this release of the specification.

5.27.4 Notifications

5.27.4.1 General

Notifications shall comply to clause 5.2.5 of 3GPP TS 29.122 [4].

Table 5.27.4.1-1: Notifications overview

| Notification | Callback URI | HTTP method or custom operation | Description (service operation) |
|--|--------------|---------------------------------|---|
| MBS User Data Ingest Session Status Notification | {notifUri} | POST | This operation enables the NEF to notify a previously subscribed AF on status changes of an MBS User Data Ingest Session. |

5.27.4.2 MBS User Data Ingest Session Status Change Notification

5.27.4.2.1 Description

The MBS user data ingest session status change notification is used by the NEF to report one or several observed MBS user data ingest session status change events to a previously subscribed AF.

5.27.4.2.2 Target URI

The Callback URI "{notifUri}" shall be used with the callback URI variables defined in table 5.27.4.2.2-1.

Table 5.27.4.2.2-1: Callback URI variables

| Name | Definition |
|----------|--|
| notifUri | Callback reference provided by the AF during the creation/update/modification of the corresponding MBS User Data Ingest Session Status Subscription. |

5.27.4.2.3 Operation Definition

5.27.4.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.27.4.2.3.1-1 and the response data structures and response codes specified in table 5.27.4.2.3.1-2.

Table 5.27.4.2.3.1-1: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|----------------------------|---|-------------|---|
| MBSUserDataIngestStatNotif | M | 1 | Provides information about the observed MBS user data ingest session status change event notification by the NEF to the AF. |

Table 5.27.4.2.3.1-2: 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 User Data Ingest Session Status Change 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 clause 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 clause 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 5.27.4.2.3.1-3: 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 5.27.4.2.3.1-4: 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. |

5.27.4.2.3.2 Notification via Websocket

If supported by both AF and NEF and successfully negotiated, the MBS User Data Ingest Session Status Change Notification may alternatively be delivered through the Websocket mechanism as defined in clause 5.2.5.4 of 3GPP TS 29.122 [4].

5.27.5 Data Model

5.27.5.1 General

This clause specifies the application data model supported by the MBSUserDataIngestSession API. Table 5.27.5.1-1 specifies the data types defined for the MBSUserDataIngestSession API.

Table 5.27.5.1-1: MBSUserDataIngestSession specific Data Types

| Data type | Clause defined | Description | Applicability |
|-----------|----------------|-------------|---------------|
| | | | |

Table 5.27.5.1-2 specifies data types re-used by the MBSUserDataIngestSession API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the MBSUserDataIngestSession API.

Table 5.27.5.1-2: Re-used Data Types

| Data type | Reference | Comments | Applicability |
|------------------------------|---------------------|--|---------------|
| MBSUserDataIngSession | 3GPP TS 29.580 [66] | Represents MBS User Data Ingest Session parameters. | |
| MBSUserDataIngSessionPatch | 3GPP TS 29.580 [66] | Represents the requested modifications to an MBS User Data Ingest Session resource representation. | |
| MBSUserDataIngStatNotif | 3GPP TS 29.580 [66] | Represents an MBS User Data Ingest Session Status Notification. | |
| MBSUserDataIngStatSubsc | 3GPP TS 29.580 [66] | Represents an MBS User Data Ingest Session Status Subscription. | |
| MBSUserDataIngStatSubscPatch | 3GPP TS 29.580 [66] | Represents the requested modifications to an MBS User Data Ingest Session Status Subscription. | |

5.27.5.2 Structured data types

5.27.5.2.1 Introduction

This clause defines the structures to be used in resource representations.

There are no structured data types defined for this API in this release of the specification.

5.27.5.3 Simple data types and enumerations

5.27.5.3.1 Introduction

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

5.27.5.3.2 Simple data types

The simple data types defined in table 5.27.5.3.2-1 shall be supported.

Table 5.27.5.3.2-1: Simple data types

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

5.27.6 Used Features

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

Table 5.27.6-1: Features used by MBSUserDataIngestSession 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]. |

5.27.7 Error handling

5.27.7.1 General

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

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

5.27.7.2 Protocol Errors

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

5.27.7.3 Application Errors

The application errors defined for the MBSUserDataIngestSession API are listed in table 5.27.7.3-1.

Table 5.27.7.3-1: Application errors

| Application Error | HTTP status code | Description |
|-------------------|------------------|-------------|
| | | |

5.28 MSEventExposure API

5.28.1 Introduction

The Nnef_MSEventExposure service shall use the MSEventExposure API.

The API URI of MSEventExposure API shall be:

{apiRoot}/3gpp-ms-event-exposure/v1

with the following components:

- "apiRoot" is set as defined in clause 5.2.4 of 3GPP TS 29.122 [4].
- "apiName" shall be set to "3gpp-ms-event-exposure".
- "apiVersion" shall be set to "v1" for the current version defined in the present document.

All resource URIs in the clauses below are defined relative to the above root URI.

5.28.2 Resources

5.28.2.1 Overview

This clause describes the structure for the Resource URIs as shown in figure 5.28.2.1-1 and the resources and HTTP methods used for the MSEventExposure API.

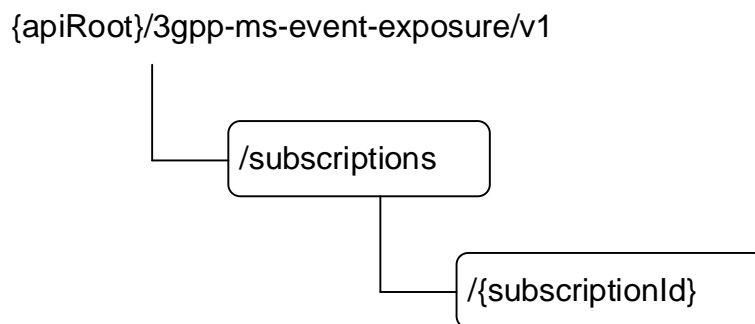


Figure 5.28.2.1-1: Resource URI structure of the MSEventExposure API

Table 5.28.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 5.28.2.1-1: Resources and methods overview

| Resource name | Resource URI (relative path under API URI) | HTTP method or custom operation | Description (service operation) |
|--|--|---------------------------------|---|
| Media Streaming Event Exposure Subscriptions | /subscriptions | GET | Reads all the existing Media Streaming Event Exposure Subscriptions. |
| | | POST | Request the creation of a Media Streaming Event Subscription. |
| Individual Media Streaming Event Exposure Subscription | /subscriptions/{subscriptionId} | GET | Read an existing Individual Media Streaming Event Exposure Subscription resource. |
| | | PUT | Update an existing Individual Media Streaming Event Exposure Subscription. |
| | | DELETE | Delete an existing Individual Media Streaming Event Exposure Subscription. |

5.28.2.2 Resource: Media Streaming Event Exposure Subscriptions

5.28.2.2.1 Introduction

This resource represents the collection of Media Streaming Event Exposure Subscription resources managed by the NEF.

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [3]).

5.28.2.2.2 Resource Definition

Resource URI: **{apiRoot}/3gpp-ms-event-exposure/v1/subscriptions**

This resource shall support the resource URI variables defined in table 5.28.2.2.2-1.

Table 5.28.2.2.2-1: Resource URI variables for this resource

| Name | Data type | Definition |
|---------|-----------|--------------------|
| apiRoot | string | See clause 5.28.1. |

5.28.2.2.3 Resource Standard Methods

5.28.2.2.3.1 GET

This method allows an AF to retrieve all the active Media Streaming Event Exposure Subscription resource at the NEF.

This method shall support the URI query parameters specified in table 5.28.2.2.3.1-1.

Table 5.28.2.2.3.1-1: 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 5.28.2.2.3.1-2 and the response data structures and response codes specified in table 5.28.2.2.3.1-3.

Table 5.28.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.28.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|---|
| array(AfEventExposureSubsc) | M | 0..N | 200 OK | Successful case. All the active Media Streaming Event Exposure Subscriptions managed by the NEF are returned. |
| 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 clause 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 clause 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. | | | | |

Table 5.28.2.2.3.1-4: 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 5.28.2.2.3.1-5: 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. |

5.28.2.2.3.2 POST

This method enables an AF to request the creation of a new Media Streaming Event Exposure Subscription at the NEF.

This method shall support the URI query parameters specified in table 5.28.2.2.3.2-1.

Table 5.28.2.2.3.2-1: 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 5.28.2.2.3.2-2 and the response data structures and response codes specified in table 5.28.2.2.3.2-3.

Table 5.28.2.2.3.2-2: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|----------------------|---|-------------|--|
| AfEventExposureSubsc | M | 1 | Contains the parameters to request the creation of a new Media Streaming Event Exposure Subscription at the NEF. |

Table 5.28.2.2.3.2-3: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response Codes | Description |
|--|---|-------------|----------------|--|
| AfEventExposureSubsc | M | 1 | 201 Created | Successful case. A new Media Streaming Event Exposure Subscription is successfully created and a representation of the created Individual Media Streaming Event Exposure Subscription resource is returned. An HTTP "Location" header that contains the resource URI of the created Individual Media Streaming Event Exposure Subscription resource shall also be included. |
| 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 5.28.2.2.3.2-4: 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-ms-event-exposure/v1/subscriptions/{subscriptionId} |

5.28.2.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

5.28.2.3 Resource: Individual Media Streaming Event Exposure Subscription

5.28.2.3.1 Introduction

This resource represents an Individual Media Streaming Event Exposure Subscription managed by the NEF.

This resource is modelled with the Document resource archetype (see clause C.1 of 3GPP TS 29.501 [3]).

5.28.2.3.2 Resource Definition

Resource URI: {apiRoot}/3gpp-ms-event-exposure/v1/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 5.28.2.3.2-1.

Table 5.28.2.3.2-1: Resource URI variables for this resource

| Name | Data type | Definition |
|----------------|-----------|--|
| apiRoot | string | See clause 5.28.1. |
| subscriptionId | string | Contains the unique identifier of the Individual Media Streaming Event Exposure Subscription resource assigned by the NEF. |

5.28.2.3.3 Resource Standard Methods

5.28.2.3.3.1 GET

This method allows an AF to retrieve an existing Individual Media Streaming Event Exposure Subscription resource at the NEF.

This method shall support the URI query parameters specified in table 5.28.2.3.3.1-1.

Table 5.28.2.3.3.1-1: 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 5.28.2.3.3.1-2 and the response data structures and response codes specified in table 5.28.2.3.3.1-3.

Table 5.28.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.28.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| AfEventExposureSubsc | M | 1 | 200 OK | Successful case. The requested Individual Media Streaming Event Exposure Subscription resource is successfully 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 clause 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 clause 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. | | | | |

Table 5.28.2.3.3.1-4: 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 5.28.2.3.3.1-5: 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. |

5.28.2.3.3.2 PUT

This method enables an AF to request the update of an existing Individual Media Streaming Event Exposure Subscription resource at the NEF.

This method shall support the URI query parameters specified in table 5.28.2.3.3.2-1.

Table 5.28.2.3.3.2-1: 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 5.28.2.3.3.2-2 and the response data structures and response codes specified in table 5.28.2.3.3.2-3.

Table 5.28.2.3.3.2-2: Data structures supported by the PUT Request Body on this resource

| Data type | P | Cardinality | Description |
|----------------------|---|-------------|---|
| AfEventExposureSubsc | M | 1 | Contains the updated representation of the Individual Media Streaming Event Exposure Subscription resource that is to be updated. |

Table 5.28.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|--|
| AfEventExposureSubsc | M | 1 | 200 OK | Successful case. The concerned Individual Media Streaming Event Exposure Subscription resource is successfully updated and a representation of the updated resource is returned in the response body. |
| n/a | | | 204 No Content | Successful case. The concerned Individual Media Streaming Event Exposure Subscription resource is successfully updated and no content is returned in the response body. |
| 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 clause 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 clause 5.2.10 of 3GPP TS 29.122 [4]. |
| NOTE: The mandatory HTTP error status code for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. | | | | |

Table 5.28.2.3.3.2-4: 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 5.28.2.3.3.2-5: 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. |

5.28.2.3.3.3 DELETE

This method enables an AF to request the deletion of an existing Individual Media Streaming Event Exposure resource at the NEF.

This method shall support the URI query parameters specified in table 5.28.2.3.3.3-1.

Table 5.28.2.3.3.3-1: 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 5.28.2.3.3.3-2 and the response data structures and response codes specified in table 5.28.2.3.3.3-3.

Table 5.28.2.3.3.3-2: Data structures supported by the DELETE Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 5.28.2.3.3.3-3: 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 Media Streaming Event Exposure resource is 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 clause 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 clause 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. | | | | |

Table 5.28.2.3.3.3-4: 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 in an alternative NEF. |

Table 5.28.2.3.3.3-5: 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 in an alternative NEF. |

5.28.2.3.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

5.28.3 Custom Operations without associated resources

There are no custom operations without associated resources defined for this API in this release of the specification.

5.28.4 Notifications

5.28.4.1 General

Notifications shall comply to clause 5.2.5 of 3GPP TS 29.122 [4].

Table 5.28.4.1-1: Notifications overview

| Notification | Callback URI | HTTP method or custom operation | Description (service operation) |
|---|--------------|---------------------------------|---|
| Media Streaming Event Exposure Notification | {notifUri} | POST | This operation enables the NEF to notify a previously subscribed AF on the Media Streaming Exposure Event(s). |

5.28.4.2 Media Streaming Event Exposure Notification

5.28.4.2.1 Description

The Media Streaming Event Exposure notification is used by the NEF to report one or several observed Media Streaming event(s) to a previously subscribed AF.

5.28.4.2.2 Target URI

The Callback URI "{notifUri}" shall be used with the callback URI variables defined in table 5.28.4.2.2-1.

Table 5.28.4.2.2-1: Callback URI variables

| Name | Definition |
|----------|--|
| notifUri | Callback reference provided by the AF during the creation/update of the corresponding Media Streaming Event Exposure Subscription. |

5.28.4.2.3 Operation Definition

5.28.4.2.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.28.4.2.3.1-1 and the response data structures and response codes specified in table 5.28.4.2.3.1-2.

Table 5.28.4.2.3.1-1: Data structures supported by the POST Request Body on this resource

| Data type | P | Cardinality | Description |
|----------------------|---|-------------|---|
| AfEventExposureNotif | M | 1 | Contains the Media Streaming Event Exposure Notification. |

Table 5.28.4.2.3.1-2: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|---|---|-------------|------------------------|---|
| N/A | | | 204 No Content | The Media Streaming Event 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 clause 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 clause 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 5.28.4.2.3.1-3: 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 5.28.4.2.3.1-4: 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. |

5.28.4.2.3.2 Notification via Websocket

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

5.28.5 Data Model

5.28.5.1 General

This clause specifies the application data model supported by the MSEventExposure API. Table 5.28.5.1-1 specifies the data types defined for the MSEventExposure API.

Table 5.28.5.1-1: MSEventExposure specific Data Types

| Data type | Clause defined | Description | Applicability |
|-----------|----------------|-------------|---------------|
| | | | |

Table 5.28.5.1-2 specifies data types re-used by the MSEventExposure API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the MSEventExposure API.

Table 5.28.5.1-2: Re-used Data Types

| Data type | Reference | Comments | Applicability |
|----------------------|---------------------|--|---------------|
| AfEventExposureNotif | 3GPP TS 29.517 [58] | Represents a Media Streaming event notification. | |
| AfEventExposureSubsc | 3GPP TS 29.517 [58] | Represents a Media Streaming event exposure subscription. Only applicable to the UE application events exposed via Data Collection AF as defined in clause 4.1.1 of 3GPP TS 29.517 [58]. | |

5.28.5.2 Structured data types

5.28.5.2.1 Introduction

This clause defines the structures to be used in resource representations.

There are no structured data types defined for this API in this release of the specification.

5.28.5.3 Simple data types and enumerations

5.28.5.3.1 Introduction

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

5.28.5.3.2 Simple data types

The simple data types defined in table 5.28.5.3.2-1 shall be supported.

Table 5.28.5.3.2-1: Simple data types

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

5.28.6 Used Features

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

Table 5.28.6-1: Features used by MSEventExposure API

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

5.28.7 Error handling

5.28.7.1 General

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

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

5.28.7.2 Protocol Errors

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

5.28.7.3 Application Errors

The application errors defined for the MSeventExposure API are listed in table 5.28.7.3-1.

Table 5.28.7.3-1: Application errors

| Application Error | HTTP status code | Description |
|-------------------|------------------|-------------|
| | | |

6 Security

TLS shall be used to support the security communication between the NEF and the AF over NEF Northbound interface as defined in clause 12 of 3GPP TS 33.501 [6]. The access to the NEFnorthbound 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], clause 5.6.2.2 and clause 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], clause 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], clause 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 clause 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 clause 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: 1.2.1
  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 V17.7.0; 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 clause 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
      operationId: ReadAllSubscriptions
      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
operationId: CreateNewSubscription
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
  operationId: ReadAnSubscription
  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: Fully updates/replaces an existing subscription resource
  operationId: FullyUpdateAnSubscription
  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: Partially updates/replaces an existing subscription resource
- operationId: PartialUpdateAnSubscription
- 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'

```

'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 clause 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".
eventReq:
  $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
eventReports:
  type: array
  items:
    $ref: '#/components/schemas/EventNotification'
  minItems: 1
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'
eventReq:
  $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
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: >
        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:
      - 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: >
        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:
      - 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: 1.1.1
  description: |
    API for NIDD Configuration Trigger.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.7.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'
security:
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.
paths:
  /:
    post:
      operationId: NiddConfigurationTrigger
      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: 1.1.2
description: |
  API for Analytics Exposure.
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  All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.8.0: 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 clause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      operationId: ReadAllSubscriptions
      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
      operationId: CreateNewSubscription
      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
    operationId: ReadAnSubscription
    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: Fully updates/replaces an existing subscription resource
    operationId: FullyUpdateAnSubscription
    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
  operationId: DeleteAnSubscription
  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
    operationId: FetchAnalyticsInfo
    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':
        description: >
          The request is rejected by the NEF and more details (not only the ProblemDetails)
          are returned.
        content:
          application/problem+json:
            schema:
              $ref:
'TS29520_Nnwdaf_AnalyticsInfo.yaml#/components/schemas/ProblemDetailsAnalyticsInfoRequest'
      '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 clause 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'
```

```
        failNotifyCode:
```

```
          $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NwdafFailureCode'
```

```
        rvWaitTime:
```



```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
  ueMobilityInfos:
    type: array
    items:
      $ref: '#/components/schemas/UeMobilityExposure'
    minItems: 1
  ueCommInfos:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/UeCommunication'
    minItems: 1
  abnormalInfos:
    type: array
    items:
      $ref: '#/components/schemas/AbnormalExposure'
    minItems: 1
  congestInfos:
    type: array
    items:
      $ref: '#/components/schemas/CongestInfo'
    minItems: 1
  nwPerfInfos:
    type: array
    items:
      $ref: '#/components/schemas/NetworkPerfExposure'
    minItems: 1
  qosSustainInfos:
    type: array
    items:
      $ref: '#/components/schemas/QosSustainabilityExposure'
    minItems: 1
  disperInfos:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/DispersionInfo'
    minItems: 1
  dnPerfInfos:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/DnPerfInfo'
    minItems: 1
  svcExps:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ServiceExperienceInfo'
    minItems: 1
  start:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
  timeStampGen:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
  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'
  dnais:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    minItems: 1
  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'
  matchingDir:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/MatchingDirection'
  reptThlds:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ThresholdLevel'
    minItems: 1
  snssai:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
  nsiIdInfos:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NsiIdInfo'
    minItems: 1
  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
  listOfAnaSubsets:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/AnalyticsSubset'
    minItems: 1
  dnPerfReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/DnPerformanceReq'
    minItems: 1
  bwRequs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/BwRequirement'
    minItems: 1
  ratFreqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/RatFreqInformation'
    minItems: 1
  appServerAddrs:
    type: array
    items:
      $ref: 'TS29517_Naf_EventExposure.yaml#/components/schemas/AddrFqdn'
    minItems: 1
  extraReportReq:

```

```

    $ref:
' TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/EventReportingRequirement '
    maxNumOfTopAppUl:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger '
    maxNumOfTopAppDl:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger '
    visitedLocAreas:
      type: array
      items:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G '
      minItems: 1
  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'
  dnais:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    minItems: 1
  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'
  nsiIdInfos:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/NsiIdInfo'
    minItems: 1
  qosReq:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/QosRequirement'
  listOfAnaSubsets:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/AnalyticsSubset'
    minItems: 1
  dnPerfReqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/DnPerformanceReq'
    minItems: 1
  bwRequs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/BwRequirement'
    minItems: 1
  ratFreqs:
    type: array
    items:
      $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/RatFreqInformation'
    minItems: 1
  appServerAdrs:
    type: array
    items:
      $ref: 'TS29517_Naf_EventExposure.yaml#/components/schemas/AddrFqdn'
    minItems: 1
  maxNumOfTopAppUl:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  maxNumOfTopAppDl:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  visitedLocAreas:
    type: array
    items:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    minItems: 1
  AnalyticsData:
    description: Represents analytics data.
    type: object
    properties:
      start:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      expiry:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      timeStampGen:
        $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
dnPerfInfos:
  type: array
  items:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/DnPerfInfo'
  minItems: 1
svcExps:
  type: array
  items:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/ServiceExperienceInfo'
  minItems: 1
disperReqs:
  type: array
  items:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/DispersionRequirement'
  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'
  dnn:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
  snssai:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
  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'
      topAppListUl:
        type: array
        items:
          $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/TopApplication'
        minItems: 1
      topAppListDl:
        type: array
        items:
          $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/TopApplication'
        minItems: 1
    required:
      - cngType
      - tmWdw
      - nsi
  QoSustainabilityExposure:
    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'
      snssai:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
      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
        - DN_PERFORMANCE
        - SERVICE_EXPERIENCE
    - 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.
        - DN_PERFORMANCE: The AF requests to be notified about analytics information of DN
        performance.
        - SERVICE_EXPERIENCE: The AF requests to be notified about analytics information of service
        experience.
AnalyticsFailureCode:
  anyOf:
    - type: string
      enum:
        - UNAVAILABLE_DATA
        - BOTH_STAT_PRED_NOT_ALLOWED
        - UNSATISFIED_REQUESTED_ANALYTICS_TIME
        - 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.
        - UNSATISFIED_REQUESTED_ANALYTICS_TIME: Indicates that the requested event is rejected since
        the analytics information is not ready when the time indicated by the timeAnaNeeded attribute (as
        provided during the creation or modification of subscription) is reached.
        - OTHER: The event is rejected due to other reasons.

```

A.5 5GLANParameterProvision API

```
openapi: 3.0.0
info:
  title: 3gpp-5glan-pp
  version: 1.1.1
  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 V17.7.0; 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-5glan-pp/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      operationId: RealAllSubscriptions
      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: '#/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
      operationId: CreateAnSubscription
      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
    operationId: ReadAnSubscription
    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: Fully updates/replaces an existing subscription resource
  operationId: FullyUpdateAnSubscription
  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
- operationId: PartialUpdateAnSubscription
- 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
- operationId: DeleteAnSubscription
- 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: 1.1.1
  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 V17.7.0; 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 clause 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
      operationId: ReadAllSubscriptions
      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
operationId: CreateNewSubscription
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
  operationId: ReadAnSubscription
  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: Partial updates/replaces an existing subscription resource
  operationId: PartialUpdateAnSubscription
  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
  operationId: DeleteAnSubscription
  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: 1.1.1
  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 V17.7.0; 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 clause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/configurations:
    get:
      summary: read all of the active configurations for the AF
      operationId: ReadAllSubscriptions
      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: '#/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 configuration resource
      operationId: CreateNewSubscription
      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
    operationId: ReadAnSubscription
    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: Fully updates/replaces an existing configuration resource
  operationId: FullyUpdateAnSubscription
  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
  operationId: PartialUpdateAnSubscription
  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
  operationId: DeleteAnSubscription
  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: >
      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:
    - 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: 1.1.2
  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 V17.8.0; 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 clause 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
      operationId: ReadAllResources
      tags:
      - LPI Parameters Provisionings
      parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string

```

```

responses:
  '200':
    description: OK (Successful get all of the active resources for the AF)
    content:
      application/json:
        schema:
          type: array
          items:
            $ref: '#/components/schemas/LpiParametersProvision'
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

```

post:
  summary: Creates a new LPI Parameters Provisioning resource
  operationId: CreateNewResource
  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
    operationId: ReadAnResource
    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: Fully updates/replaces an existing LPI Parameters Provisioning resource
    operationId: FullyUpdateAnResource
    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: Partially modifies an existing LPI Parameters Provisioning resource.
operationId: PartialUpdateAnResource
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
  operationId: DeleteAnResource
  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: 1.1.3
  description: |
    API for AF service paramter
    © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  externalDocs:
    description: >
      3GPP TS 29.522 V17.9.0; 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 clause 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
      operationId: ReadAllSubscriptions
      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
  operationId: CreateAnSubscription
  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
    operationId: ReadAnSubscription
    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: Fully updates/replaces an existing subscription resource
    operationId: FullyUpdateAnSubscription
    tags:
      - Individual Service Parameter Subscription
    requestBody:
      description: Parameters to update/replace the existing subscription
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ServiceParameterData'
    responses:
      '200':
        description: OK (Successful update of the subscription)
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ServiceParameterData'
      '204':
        description: OK (Successful update of the subscription)
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
```

```

'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

patch:
  summary: Partial updates/replaces an existing subscription resource
  operationId: PartialUpdateAnSubscription
  tags:
    - Individual Service Parameter Subscription
  requestBody:
    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/ServiceParameterDataPatch'
  responses:
    '200':
      description: OK. The subscription was modified successfully.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ServiceParameterData'
    '204':
      description: OK. The subscription was modified successfully.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:
  summary: Deletes an already existing subscription
  operationId: DeleteAnSubscription
  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 clause 5.2.5.3 of 3GPP TS 29.122. Set to false or omitted otherwise.
        websocketNotifConfig:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsocketNotifConfig'
        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'
    relatPrecedence:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
    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'
    spatialValidityAreas:
      type: array
      items:
        $ref: 'TS29522_AMPolicyAuthorization.yaml#/components/schemas/GeographicalArea'
      minItems: 1
      description: >
        Indicates where the route selection parameters apply. It may correspond
        to a geographical area, for example using a geographic shape 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'
    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'
    eventInfo:
      $ref: '#/components/schemas/EventInfo'
  required:
    - subscription
  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
        - UE_TEMP_UNREACHABLE
      - type: string
      description: >
        This string represents the failure reason for the unsuccessful result. May be
        present if the reported reportEvent 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.
        - UE_TEMP_UNREACHABLE: Indicates the PCF received the notification from the AMF that the UE
          is not reachable but the PCF will retry again.
  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: 1.1.2
  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 V17.8.0; 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 clause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      operationId: ReadAllSubscriptions
      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
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '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
      operationId: CreateAnSubscription
      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
    operationId: ReadAnSubscription
    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: Fully updates/replaces an existing subscription resource
  operationId: FullyUpdateAnSubscription
  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: Partial modifies an existing subscription resource.
  operationId: PartialUpdateAnSubscription
  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
  operationId: DeleteAnSubscription
  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: 1.1.1
description: |
  API for UE updated location information notification.
  © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.7.0: 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-mo-lcs-notify/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.
paths:
  /:
    post:
      summary: UE location information update notification
      operationId: UELocationNotify
      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: 1.0.1
  description: |
    API for AKMA.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.7.0; 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 clause 5.2.4 of 3GPP TS 29.122.
paths:
  /retrieve:
    post:
      summary: Retrieve AKMA Application Key Information.
      operationId: RetrieveAKMAAppKey
      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'
        anonInd:
          type: boolean
          description: >
            Indicates whether an anonymous user access. Set to "true" if an anonymous user access is
            requested; otherwise set to "false". Default value is "false" if omitted.
          default: false
      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: 1.0.1
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 V17.7.0: 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 clause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/subscriptions:
    get:
      summary: read all of the active subscriptions for the AF
      operationId: ReadAllSubscriptions
      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
      operationId: CreateNewSubscription
      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
- operationId: ReadAnSubscription
- 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'

`put`:

- summary: Fully updates/replaces an existing subscription resource
- operationId: FullyUpdateAnSubscription
- 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
- requestBody:
 - description: Parameters to update/replace the existing subscription
 - required: true
 - content:
 - application/json:
 - schema:


```

    $ref: '#/components/schemas/TimeSyncExposureSubsc'
responses:
  '200':
    description: OK (Successful deletion of the existing subscription)
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/TimeSyncExposureSubsc'
  '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
  operationId: DeleteAnSubscription
  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
    operationId: ReadAllConfigurations
    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
    operationId: CreateNewConfiguration
    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
      operationId: ReadTimeSynSubscription
      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: Fully updates/replaces an existing configuration resource
      operationId: FullyUpdateAnConfiguration
      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
  operationId: DeleteAnConfiguration
  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'

```

```

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 clause 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'
    timeSyncErrBdgt:
      $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:
  stateOfNwtt:
    type: boolean
    description: >
      When the PTP port state is Leader, Follower or Passive, it is included and set to true
      to indicate the state of configuration for NW-TT port is active; when PTP port state is
      in any other case, it is included and set to false to indicate the state of
      configuration for NW-TT port is inactive. Default value is false.
  stateOfDstts:
    description: >
      Contains the PTP port states of the DS-TT(s).
    type: array
    items:
      $ref: '#/components/schemas/StateOfDstt'
    minItems: 1

StateOfDstt:
description: Contains the PTP port state of a DS-TT.
type: object
properties:
  gpsi:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
  state:
    type: boolean
    description: >
      When the PTP port state is Leader, Follower or Passive, it is included and set to true
      to indicate the state of configuration for DS-TT port is active; when PTP port state is
      in any other case, it is included and set to false to indicate the state of
      configuration for DS port is inactive. Default value is false.
required:
- gpsi
- 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.

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 grandmaster 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: 1.0.1
  description: |
    API for ECS Address Provisioning.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.7.0; 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 clause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/configurations:
    get:
      summary: Read all active configurations for a given AF
      operationId: ReadAllConfigurations
      tags:
        - ECS Address Provision Configurations (Collection)
      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: '#/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 configuration resource

```

```

operationId: CreateNewConfiguration
tags:
  - ECS Address Provision Configurations (Collection)
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
  operationId: ReadAnConfiguration
  tags:
    - Individual ECS Address Provision 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 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: Fully updates/replaces an existing resource
operationId: FullyUpdateAnConfiguration
tags:
  - Individual ECS Address Provision 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 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
  operationId: DeleteAnConfiguration
  tags:
    - Individual ECS Address Provision 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 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: 1.0.2
  description: |
    API for AM policy authorization.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: >
    3GPP TS 29.522 V17.8.0; 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 clause 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
        '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#/evSubscs/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'

```

```

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:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
callbacks:
  amEventNotification:
    '{$request.body#/evSubscs/eventNotifUri}':
      post:
        requestBody:
          description: Contains the information for the 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 the AM Policy Events Subscription sub-resource
  operationId: DeleteAmEventsSubsc
  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 Individual Application AM Context resource.
      required: true
      schema:
        type: string
  responses:
    '204':
      description: >
        The deletion of the 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'
    '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:
    AppAmContextExpData:
      description: Represents an Individual application AM context exposure resource.
      type: object
      properties:

```

```

self:
  $ref: 'TS29122_CommonData.yaml#/components/schemas/Link'
evSubscs:
  $ref: 'TS29534_Npcf_AMPolicyAuthorization.yaml#/components/schemas/AmEventsSubscData'
gpsi:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
highThruInd:
  type: boolean
covReqs:
  type: array
  items:
    $ref: '#/components/schemas/GeographicalArea'
  minItems: 1
  nullable: true
policyDuration:
  $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSecRm'
suppFeat:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
requestTestNotification:
  type: boolean
  description: >
    Set to true by the AF to request the NEF to send a test notification
    as defined in clause 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]

AppAmContextExpUpdateData:
  description: >
    Contains the modification(s) to be applied to the Individual application
    AM context exposure resource.
  type: object
  properties:
    evSubscs:
      $ref: 'TS29534_Npcf_AMPolicyAuthorization.yaml#/components/schemas/AmEventsSubscDataRm'
    highThruInd:
      type: boolean
    covReqs:
      type: array
      items:
        $ref: '#/components/schemas/GeographicalArea'
      minItems: 1
    policyDuration:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'

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: 1.0.1

description: |

AMInfluence API Service.

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```

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externalDocs:
  description: >
    3GPP TS 29.522 V17.7.0; 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
        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: 'TS29122_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 clause 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
    nullable: true
  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.
    nullable: true
  policyDuration:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSecRm'
  dnnSnssaiInfos:
    type: array
    items:
      $ref: '#/components/schemas/DnnSnssaiInformation'
    minItems: 1
    nullable: true
    description: Each of the element identifies a (DNN, S-NSSAI) combination.
  afAppIds:
    type: array
    items:
      type: string
    minItems: 1
    nullable: true
    description: Each of the element identifies an application.
  subscribedEvents:
    type: array
    items:
      $ref: '#/components/schemas/AmInfluEvent'
    minItems: 1
    nullable: true
    description: Indicates one or more AM influence related events.
  notificationDestination:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/LinkRm'
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
      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.

```

A.17 MBSTMGI API

```
openapi: 3.0.0
info:
  title: 3gpp-mbs-tmgi
  version: 1.0.3
  description: |
    API for the allocation, deallocation and management of TMGI(s) for MBS.
    © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V17.10.0; 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 clause 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: >
            OK. 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 MBS 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: No content. The notification is successfully received.
        '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 MBS TMGI(s).
    operationId: DeallocateTmgi
    tags:
      - MBS TMGI Deallocation
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/TmgiDeallocRequest'
    responses:
      '204':
        description: No Content. Successful case, the TMGI(s) are 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 an MBS 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'
    mbsServiceArea:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsServiceArea'
    extMbsServiceArea:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ExternalMbsServiceArea'
    requestTestNotification:
      type: boolean
    websockNotifConfig:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/WebsockNotifConfig'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - afId
    - tmgiParams
  not:
    required: [mbsServiceArea, extMbsServiceArea]

```

TmgiAllocResponse:

```

  description: >
    Represents MBS 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 MBS 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 MBS 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: 1.1.1
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 V17.8.0; 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: Request the creation of a new MBS Session.
    tags:
      - MBS Sessions collection
    operationId: CreateMBSSession
    requestBody:
      description: Representation of the new MBS session to be created at the NEF.
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MbsSessionCreateReq'
    responses:
      '201':
        description: >
          Created. Successful creation of a new Individual MBS session resource.
        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/mbs-sessions/{mbsSessionRef}
            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/{mbsSessionRef}:
  parameters:
    - name: mbsSessionRef
      in: path
      description: Identifier of the Individual MBS Session resource.
      required: true
      schema:
        type: string

  patch:
    summary: Request the modification of an existing Individual MBS Session resource.
    operationId: ModifyIndMBSSession
    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 concerned 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: Request the Deletion of an existing Individual MBS Session resource.
    operationId: DeleteIndMBSSession
    tags:
      - Individual MBS Session
    responses:
      '204':
        description: >
          No Content. Successful deletion of the concerned Individual 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: Retrieve all the active MBS Sessions subscriptions.

operationId: ReadMBSSessionsSubscs

tags:

- MBS Session Subscriptions

responses:

'200':

description: >

OK. All the active MBS Session Subscriptions resources managed by the NEF are returned.

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: Request the creation of a new Individual MBS Session subscription resource.

operationId: CreateMBSSessionsSubsc

tags:

- MBS Session Subscriptions

requestBody:

description: Request the creation of a new MBS Session subscription resource.

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/MbsSessionSubsc'

responses:

'201':

description: >

Created. Successful creation of a new Individual MBS Session subscription.

content:

application/json:

schema:

\$ref: '#/components/schemas/MbsSessionSubsc'

headers:

```

    Location:
      description: Contains the URI of the newly created resource, according to the
        structure
      {apiRoot}/3gpp-mbs-session/v1/mbs-sessions/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:
  MBSSessionStatusNotification:
    '{request.body#/notificationUri}':
      post:
        requestBody:
          required: true
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MbsSessionStatusNotif'
        responses:
          '204':
            description: No Content. Successful reception of the 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'

/mbs-sessions/subscriptions/{subscriptionId}:
  parameters:
    - name: subscriptionId
      in: path
      description: Identifier of the Individual MBS Session Subscription resource.
      required: true
      schema:
        type: string

```

```
get:
  summary: Retrieve an existing Individual MBS Session Subscription resource.
  operationId: ReadIndMBSSESSIONSSubsc
  tags:
    - Individual MBS Session subscription
  responses:
    '200':
      description: >
        OK. Successful retrieval of the targeted Individual MBS Session subscription resource.
      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: Request the deletion of an existing Individual MBS Session subscription resource.
  operationId: DeleteIndMBSSESSIONSSubsc
  tags:
    - Individual MBS Session Subscription
  responses:
    '204':
      description: >
        No Content. Successful deletion of the existing Individual MBS Session subscription
        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-pp:
```

```
get:
  summary: Request to retrieve all the active MBS Parameters Provisioning resources at the NEF.
  operationId: GetMBSParamsProvisionings
  tags:
    - MBS Parameters Provisionings
  responses:
    '200':
      description: >
        OK. All the active MBS Parameters Provisioning resources managed by the NEF are
        returned.
```

```

    content:
      application/json:
        schema:
          type: array
          items:
            $ref: '#/components/schemas/MbsPpData'
          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: Request the creation of a new MBS Parameters Provisioning.
  tags:
    - MBS Parameters Provisioning
  operationId: CreateMBSParamsProvisioning
  requestBody:
    description: Representation of the new MBS Parameters Provisioning to be created at the NEF.
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MbsPpData'
  responses:
    '201':
      description: >
        Created. Successful creation of a new Individual MBS Parameters Provisioning resource.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MbsPpData'
      headers:
        Location:
          description: >
            Contains the URI of the newly created resource, according to the structure
            {apiRoot}/3gpp-mbs-session/v1/mbs-pp/{mbsPpId}
          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-pp/{mbsPpId}:
  parameters:
    - name: mbsPpId
      in: path
      description: >
        Represents the identifier of the Individual MBS Parameters Provisioning resource.
      required: true
      schema:
        type: string

  get:
    summary: Request to retrieve an existing Individual MBS Parameters Provisioning resource.
    operationId: GetIndMBSParamsProvisioning
    tags:
      - Individual MBS Parameters Provisioning
    responses:
      '200':
        description: >
          OK. Successful retrieval of the requested Individual MBS Parameters Provisioning resource.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MbsPpData'
      '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: Request the update of an existing Individual MBS Parameters Provisioning resource.
    tags:
      - Individual MBS Parameters Provisioning
    operationId: UpdateIndMBSParamsProvisioning
    requestBody:
      description: >
        Represents the updated Individual MBS Parameters Provisioning resource representation.
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MbsPpData'
    responses:
      '200':
        description: >
          OK. The Individual MBS Parameters Provisioning resource is successfully updated and a representation of the updated resource is returned in the response body.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MbsPpData'
      '204':
        description: >
          No Content. The Individual MBS Parameters Provisioning resource is successfully updated.
      '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: Request the modification of an existing Individual MBS Parameters Provisioning resource.

tags:

- Individual MBS Parameters Provisioning

operationId: ModifyIndMBSParamsProvisioning

requestBody:

description: >

Contains the parameters to request the modification of the Individual Parameters Provisioning resource.

required: true

content:

application/merge-patch+json:

schema:

\$ref: '#/components/schemas/MbsPpDataPatch'

responses:

'200':

description: >

OK. The Individual MBS Parameters Provisioning resource is successfully modified and a representation of the updated resource is returned in the response body.

content:

application/json:

schema:

\$ref: '#/components/schemas/MbsPpData'

'204':

description: >

No Content. The Individual MBS Parameters Provisioning resource is 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: Request the deletion of an existing Individual MBS Parameters Provisioning resource.
  tags:
    - Individual MBS Parameters Provisioning
  operationId: DeleteIndMBSParamsProvisioning
  responses:
    '204':
      description: >
        No Content. The Individual MBS Parameters Provisioning resource is successfully
        deleted.
    '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: Represents the parameters to request MBS Session creation.
  type: object
  properties:
    afId:
      type: string
    mbsSession:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSession'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - afId
    - mbsSession

```

```

MbsSessionCreateRsp:
  description: Represents the parameters to be returned in an MBS Session creation response..
  type: object
  properties:
    mbsSession:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSession'
    eventList:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSessionEventReportList'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - mbsSession

```

```

MbsSessionSubsc:
  description: Represents an MBS Session Subscription.
  type: object
  properties:
    afId:
      type: string

```

```

    subscription:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSessionSubscription'
    subscriptionId:
      type: string
    required:
      - afId
      - subscription

MbsSessionStatusNotif:
  description: Represents an MBS Session Status notification.
  type: object
  properties:
    eventList:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSessionEventReportList'
  required:
    - eventList

MbsPpData:
  description: Represents MBS Parameters Provisioning data.
  type: object
  properties:
    afId:
      type: string
    mbsSessAuthData:
      $ref: '#/components/schemas/MbsSessAuthData'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - afId

MbsSessAuthData:
  description: Represents the MBS Session Authorization data.
  type: object
  properties:
    extGroupId:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
    gpsisList:
      type: object
      additionalProperties:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
      minProperties: 1
      description: >
        Represents the list of the GPSI(s) of the member UE(s) constituting the multicast MBS
        group. Any
        value of type can be used as a key of the map.
    mbsSessionIdList:
      $ref: 'TS29503_Nudm_PP.yaml#/components/schemas/5MbsAuthorizationInfo'
  required:
    - extGroupId
    - mbsSessionIdList

MbsPpDataPatch:
  description: >
    Represents the requested modification to existing MBS Parameters Provisioning data.
  type: object
  properties:
    mbsSessAuthData:
      $ref: '#/components/schemas/MbsSessAuthData'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'

#
# SIMPLE DATA TYPES
#
#
# ENUMERATIONS
#

```

A.19 EASDeployment API

```

openapi: 3.0.0
info:
  title: 3gpp-eas-deployment
  version: 1.0.2

```



```
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 V17.8.0; 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 clause 5.2.4 of 3GPP TS 29.122.
paths:
  /{afId}/eas-deployment-info:
    get:
      summary: Read all EAS Deployment information for a given AF
      operationId: ReadAllDeployment
      tags:
        - EAS Deployment Information (Collection)
      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: '#/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: Create a new Individual EAS Deployment information resource.
      operationId: CreateAnDeployment
      tags:
        - EAS Deployment Information (Collection)
      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
    operationId: ReadAnDeployment
    tags:
      - Individual EAS Deployment Information
    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: Fully updates/replaces an existing resource
  operationId: FullyUpdateAnDeployment
  tags:
    - Individual EAS Deployment Information
  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
  operationId: DeleteAnDeployment

```

```

tags:
  - Individual EAS Deployment Information
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'
/remove-edis:
  post:
    summary: Remove EAS Deployment Information based on given criteria.
    operationId: DeleteEDIs
    tags:
      - EAS Deployment Information removal
    requestBody:
      description: Criteria to be used for deleting EAS Deployment Information that match them.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/EdiDeleteCriteria'
      required: true
    responses:
      '204':
        description: >
          No Content. The EDIs matching the provided criteria have been successfully deleted.
      '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'

```

```

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
        fqdnPatternList:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/FqdnPatternMatchingRule'
          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:
          - fqdnPatternList
    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
        easIpAddrs:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
          minItems: 1
        required:
          - dnai
        anyOf:
          - required: [dnsServIds]
          - required: [easIpAddrs]
    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
    EdiDeleteCriteria:
      description: >
        Contains criteria to be used for deleting EAS Deployment Information entries that match
        them.
      type: object

```

```

properties:
  afId:
    $ref: 'TS29522_AKMA.yaml#/components/schemas/AfId'
  dnnSnssai:
    $ref: 'TS29522_AMInfluence.yaml#/components/schemas/DnnSnssaiInformation'
  anyOf:
    - required: [afId]
    - required: [dnnSnssai]

```

A.20 ASTI API

openapi: 3.0.0

```

info:
  title: 3gpp-asti
  version: 1.0.1
  description: |
    API for ASTI.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

```

```

externalDocs:
  description: >
    3GPP TS 29.522 V17.7.0; 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-asti/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 of 5G access stratum time distribution for the
      AF
      operationId: ReadAllConfigurations
      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
  operationId: CreateNewConfiguration
  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}/configurations/retrieve:
  post:
    summary: Request the status of the 5G access stratum time distribution configuration for a
    list of UEs.
    operationId: RetrieveStatusofConfiguration
    tags:
      - ASTI Configurations
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string

```

```

requestBody:
  description: Contains the list of GPSIs.
  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: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '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/{configId}:
  get:
    summary: Reads an active configuration for the AF and the configuration Id
    operationId: ReadAnConfiguration
    tags:
      - Individual ASTI Configuration
    parameters:
      - name: afId
        in: path
        description: Identifier of the AF
        required: true
        schema:
          type: string
      - name: configId
        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'

put:
  summary: Modifies an active configuration for the AF and the configuration Id
  operationId: FullyModifyAnConfiguration
  tags:
    - Individual ASTI Configuration
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF
      required: true
      schema:
        type: string
    - name: configId
      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/AccessTimeDistributionData'
  responses:
    '200':
      description: OK (Successful update of the configuration)
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AccessTimeDistributionData'
    '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 configuration
  operationId: DeleteAnConfiguration
  tags:
    - Individual ASTI Configuration
  parameters:
    - name: afId
      in: path
      description: Identifier of the AF

```

```

    required: true
    schema:
      type: string
  - name: configId
    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:

```

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'
    asTimeDisParam:
      $ref: 'TS29565_Ntsctsf_ASTI.yaml#/components/schemas/AsTimeDistributionParam'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - asTimeDisParam
  oneOf:
    - required: [gpsis]
    - required: [interGrpId]

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
  required:
  - gpsi

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'

```

A.21 DataReporting API

```

openapi: 3.0.0
info:
  title: 3gpp-data-reporting
  version: 1.0.0
  description: |
    API for 3GPP Data Reporting.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V17.6.0; 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-data-reporting/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.

paths:
  /sessions:
    post:
      summary: Create a new Data Reporting Session.
      operationId: CreateDataRepSession
      tags:
        - Data Reporting Sessions
      requestBody:
        description: >
          Representation of the Data Reporting Session to be created in the NEF.
        required: true
        content:
          application/json:
            schema:
              $ref: 'TS26532_Ndcaf_DataReporting.yaml#/components/schemas/DataReportingSession'

```

```

responses:
  '201':
    description: Created. Successful creation of a new Data Reporting Session.
    content:
      application/json:
        schema:
          $ref: 'TS26532_Ndcaf_DataReporting.yaml#/components/schemas/DataReportingSession'
    headers:
      Location:
        required: true
        schema:
          type: string
        description: >
          Contains the URI of the newly created resource, according to the structure
          {apiRoot}/3gpp-data-reporting/v1/sessions/{sessionId}
  '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'

/sessions/{sessionId}:
  parameters:
    - name: sessionId
      in: path
      description: Identifier of the Data Reporting Session.
      required: true
      schema:
        type: string
  get:
    summary: Request the retrieval of an existing Individual Data Reporting Session resource.
    operationId: GetIndDataRepSession
    tags:
      - Individual Data Reporting Session
    responses:
      '200':
        description: >
          OK. The requested Individual Data Reporting Session resource is
          Successfully returned.
        content:
          application/json:
            schema:
              $ref: 'TS26532_Ndcaf_DataReporting.yaml#/components/schemas/DataReportingSession'
      '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'

put:
  summary: Request the update of an existing Individual Data Reporting Session resource.
  operationId: UpdateIndDataRepSession
  tags:
    - Individual Data Reporting Session
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: 'TS26532_Ndcaf_DataReporting.yaml#/components/schemas/DataReportingSession'
  responses:
    '200':
      description: >
        OK. The Individual Data Reporting Session resource was successfully
        updated.
      content:
        application/json:
          schema:
            $ref: 'TS26532_Ndcaf_DataReporting.yaml#/components/schemas/DataReportingSession'
    '204':
      description: >
        No Content. The Individual Data Reporting Session resource was successfully
        updated and no content is returned in the response 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'

delete:
  summary: Deletes an already existing Data Reporting Session resource.
  operationId: DeleteIndDataRepSession
  tags:
    - Individual Data Reporting Session
  responses:
    '204':
      description: >
        No Content. The concerned Individual Data Reporting Session resource was
        successfully deleted.
    '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'

/sessions/{sessionId}/report:
  parameters:
    - name: sessionId
      in: path
      description: Identifier of the Data Reporting Session.
      required: true
      schema:
        type: string
  post:
    summary: Report collected UE data.
    operationId: ReportUEData
    tags:
      - Individual Data Reporting Session
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: 'TS26532_Ndcaf_DataReporting.yaml#/components/schemas/DataReport'
    responses:
      '200':
        description: OK. The UE data report was successfully received.
        content:
          application/json:
            schema:
              $ref: 'TS26532_Ndcaf_DataReporting.yaml#/components/schemas/DataReportingSession'
      '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: {}

```

A.22 DataReportingProvisioning API

```

openapi: 3.0.0
info:
  title: 3gpp-data-reporting-provisioning
  version: 1.0.1
  description: |
    API for 3GPP Data Reporting and Provisioning.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V17.7.0; 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-data-reporting-provisioning/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.

paths:
  /sessions:
    post:
      summary: Create a new Data Reporting Provisioning Session.
      operationId: CreateDataRepProvSession
      tags:
        - Data Reporting Provisioning Sessions
      requestBody:
        description: >
          Representation of the Data Reporting Provisioning Session to be created in the NEF.
        required: true
        content:
          application/json:
            schema:
              $ref:
                'TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingProvisioningSession'
      responses:
        '201':
          description: Created. Successful creation of a new Data Reporting Provisioning Session.
          content:
            application/json:
              schema:
                $ref:
                  'TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingProvisioningSession'
        headers:
          Location:
            required: true
            schema:
              type: string
            description: >
              Contains the URI of the newly created resource, according to the structure
              {apiRoot}/3gpp-data-reporting-provisioning/v1/sessions/{sessionId}
        '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'

/sessions/{sessionId}:
  parameters:
    - name: sessionId
      in: path
      description: Identifier of the Data Reporting Provisioning Session.
      required: true
      schema:
        type: string
  get:
    summary: Request the retrieval of an existing Individual Data Reporting Provisioning Session
    resource.
    operationId: GetIndDataRepProvSession
    tags:
      - Individual Data Reporting Provisioning Session
    responses:
      '200':
        description: >
          OK. The requested Individual Data Reporting Provisioning Session resource is
          Successfully returned.
        content:
          application/json:
            schema:
              $ref:
'
TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingProvisioningSession'
      '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 Individual Data Reporting Provisioning Session resource.
    operationId: DeleteIndDataRepProvSession
    tags:
      - Individual Data Reporting Provisioning Session
    responses:
      '204':
        description: >
          No Content. The concerned Individual Data Reporting Provisioning Session resource was
          successfully deleted.
      '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'

/sessions/{sessionId}/configurations:
  parameters:
    - name: sessionId
      in: path
      description: Identifier of the Data Reporting Provisioning Session.
      required: true
      schema:
        type: string
  post:
    summary: Create a new Data Reporting Configuration resource.
    operationId: CreateDataRepConfig
    tags:
      - Data Reporting Configurations
    requestBody:
      description: >
        Representation of the Data Reporting Configuration to be created in the NEF.
      required: true
      content:
        application/json:
          schema:
            $ref: 'TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingConfiguration'
    responses:
      '201':
        description: Created. Successful creation of a new Data Reporting Configuration.
        content:
          application/json:
            schema:
              $ref: 'TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingConfiguration'
      headers:
        Location:
          required: true
          schema:
            type: string
          description: >
            Contains the URI of the newly created resource, according to the structure
            {apiRoot}/3gpp-data-reporting-
            provisioning/v1/sessions/{sessionId}/configurations/{configurationId}
    '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'

/sessions/{sessionId}/configurations/{configurationId}:
  parameters:
    - name: sessionId
      in: path
      description: Identifier of the Data Reporting Provisioning Session.
      required: true
      schema:

```

```

    type: string
  - name: configurationId
    in: path
    description: Identifier of the Data Reporting Configuration.
    required: true
    schema:
      type: string
  get:
    summary: Request the retrieval of an existing Individual Data Reporting Configuration
resource.
    operationId: GetIndDataRepConfig
    tags:
      - Individual Data Reporting Configuration
    responses:
      '200':
        description: >
          OK. The requested Individual Data Reporting Configuration resource is successfully
          returned.
        content:
          application/json:
            schema:
              $ref:
'TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingConfiguration'
      '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'
  put:
    summary: Request to update an existing Individual Data Reporting Configuration resource.
    operationId: UpdateIndDataRepConfig
    tags:
      - Individual Data Reporting Configuration
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref:
'TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingConfiguration'
    responses:
      '200':
        description: >
          OK. The Individual Data Reporting Configuration resource was successfully updated.
        content:
          application/json:
            schema:
              $ref:
'TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingConfiguration'
      '204':
        description: >
          No Content. The Individual Data Reporting Configuration resource was successfully
          updated and no content is returned in the response 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'

```

patch:

summary: Request to modify an existing Individual Data Reporting Configuration resource.
 operationId: ModifyIndDataRepConfig

tags:

- Individual Data Reporting Configuration

requestBody:

required: true

content:

application/json:

schema:

\$ref:

'TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingConfigurationPatch'

responses:

'200':

description: >

OK. The Individual Data Reporting Configuration resource was successfully modified.

content:

application/json:

schema:

\$ref:

'TS26532_Ndcaf_DataReportingProvisioning.yaml#/components/schemas/DataReportingConfiguration'

'204':

description: >

No Content. The Individual Data Reporting Configuration resource was successfully modified and no content is returned in the response 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'

delete:

summary: Deletes an already existing Data Reporting Configuration resource.

```

operationId: DeleteIndDataRepConfig
tags:
  - Individual Data Reporting Configuration
responses:
  '204':
    description: >
      No Content. The concerned Individual Data Reporting Configuration resource was
      successfully deleted.
  '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: {}

```

A.23 UEId API

openapi: 3.0.0

info:

```

title: 3gpp-ueid
version: 1.0.1
description: |
  API for UE ID service.
  © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.

```

externalDocs:

```

description: 3GPP TS 29.522 V17.7.0; 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-ueid/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 AF specific UE ID.
    operationId: RetrieveUEId
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/UeIdReq'
    responses:

```

```

'200':
  description: The requested information was returned successfully.
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/UEIdInfo'
'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:
    UEIdReq:
      description: Represents the parameters to request the retrieval of AF specific UE ID.
      type: object
      properties:
        afId:
          type: string
        appPortId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Port'
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        ipDomain:
          type: string
        mtcProviderId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MtcProviderInformation'
        snssai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        ueIpAddr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/IpAddr'
        ueMacAddr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
      required:
        - afId
      oneOf:
        - required: [ueIpAddr]
        - required: [ueMacAddr]
    UEIdInfo:
      description: Represents UE ID information.
      type: object
      properties:
        externalId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalId'
      required:
        - externalId

```

A.24 MBSUserService API

```
openapi: 3.0.0

info:
  title: 3gpp-mbs-us
  version: 1.0.2
  description: |
    API for MBS User Service.
    © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.522 V17.9.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

servers:
- url: '{apiRoot}/3gpp-mbs-us/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122

security:
- {}
- oAuth2ClientCredentials: []

paths:
  /mbs-user-services:
    get:
      summary: Retrieve all the active MBS User Service resources managed by the NEF.
      tags:
        - MBS User Services
      operationId: RetrieveMBSUserServices
      responses:
        '200':
          description: >
            OK. All the active MBS User Services managed by the NEF are returned.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: 'TS29580_Nmbsf_MBSUserService.yaml#/components/schemas/MBSUserService'
                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: Request the creation of a new Individual MBS User Service resource.
      tags:
        - MBS User Services
      operationId: CreateMBSUserService
      requestBody:
        description: >
          Contains the parameters to request the creation of a new MBS User Service at the NEF.
```

```

    required: true
    content:
      application/json:
        schema:
          $ref: 'TS29580_Nmbfsf_MBSUserService.yaml#/components/schemas/MBSUserService'
  responses:
    '201':
      description: >
        Created. A new MBS User Service is successfully created and a representation of the
        created Individual MBS User Service resource is returned.
      content:
        application/json:
          schema:
            $ref: 'TS29580_Nmbfsf_MBSUserService.yaml#/components/schemas/MBSUserService'
      headers:
        Location:
          description: >
            Contains the URI of the newly created resource, according to the structure
            {apiRoot}/3gpp-mbs-us/v1/mbs-user-services/{mbsUserServId}
          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-user-services/{mbsUserServId}:
  parameters:
    - name: mbsUserServId
      in: path
      description: Identifier of the Individual MBS User Service resource.
      required: true
      schema:
        type: string

  get:
    summary: Retrieve an existing Individual MBS User Service resource.
    tags:
      - Individual MBS User Service
    operationId: RetrieveIndivMBSUserService
    responses:
      '200':
        description: >
          OK. The requested Individual MBS User Service resource is successfully returned.
        content:
          application/json:
            schema:
              $ref: 'TS29580_Nmbfsf_MBSUserService.yaml#/components/schemas/MBSUserService'
      '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: Request the update of an existing Individual MBS User Service resource.
  tags:
    - Individual MBS User Service
  operationId: UpdateIndivMBSUserService
  requestBody:
    description: >
      Contains the updated representation of the Individual MBS User Service resource.
    required: true
    content:
      application/json:
        schema:
          $ref: 'TS29580_Nmbssf_MBSUserService.yaml#/components/schemas/MBSUserService'
  responses:
    '200':
      description: >
        OK. The concerned Individual MBS User Service resource is successfully updated and a
        representation of the updated resource is returned.
      content:
        application/json:
          schema:
            $ref: 'TS29580_Nmbssf_MBSUserService.yaml#/components/schemas/MBSUserService'
    '204':
      description: >
        No Content. The concerned Individual MBS User Service resource is successfully updated.
    '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: Request the modification of an existing Individual MBS User Service resource.
  tags:
    - Individual MBS User Service
  operationId: ModifyIndivMBSUserService
  requestBody:
    description: >
      Contains the parameters to request the modification of the Individual MBS User
      Service resource.
    required: true
    content:
      application/merge-patch+json:
        schema:

```



```

    $ref: 'TS29580_Nmbssf_MBSUserService.yaml#/components/schemas/MBSUserServicePatch'
responses:
  '200':
    description: >
      OK. The concerned Individual MBS User Service resource is successfully modified and a
      representation of the updated resource is returned.
    content:
      application/json:
        schema:
          $ref: 'TS29580_Nmbssf_MBSUserService.yaml#/components/schemas/MBSUserService'
  '204':
    description: >
      No Content. The concerned Individual MBS User Service resource is 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 existing Individual MBS User Service resource.
  tags:
    - Individual MBS User Service
  operationId: DeleteIndivMBSUserService
  responses:
    '204':
      description: >
        No Content. The Individual MBS User Service resource is successfully deleted.
    '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: {}

#
# STRUCTURED DATA TYPES
#

# SIMPLE DATA TYPES
#

#
# ENUMERATIONS
#

```

A.25 MBSUserDataIngestSession API

openapi: 3.0.0

info:

```

title: 3gpp-mbs-ud-ingest
version: 1.0.2
description: |
  API for MBS User Data Ingest Session.
  © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.

```

externalDocs:

```

description: >
  3GPP TS 29.522 V17.9.0; 5G System; Network Exposure Function Northbound APIs.
url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

```

servers:

```

- url: '{apiRoot}/3gpp-mbs-ud-ingest/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122

```

security:

```

- {}
- oAuth2ClientCredentials: []

```

paths:

```

/sessions:
  get:
    summary: Retrieve all the active MBS User Data Ingest Sessions managed by the NEF.
    tags:
      - MBS User Data Ingest Sessions (Collection)
    operationId: RetrieveMBSUserDataIngestSessions
    responses:
      '200':
        description: >
          OK. All the active MBS User Data Ingest Sessions managed by the NEF are returned.
        content:
          application/json:
            schema:
              type: array
              items:
                $ref:
' TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngSession'
            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: Request the creation of a new Individual MBS User Data Ingest Session resource.
  tags:
    - MBS User Data Ingest Sessions (Collection)
  operationId: CreateMBSUserDataIngestSession
  requestBody:
    description: >
      Contains the parameters to request the creation of a new MBS User Data Ingest Session
      at the NEF.
    required: true
    content:
      application/json:
        schema:
          $ref:
'TS29580_Nmbssf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngSession'
  responses:
    '201':
      description: >
        Created. A new MBS User Data Ingest Session is successfully created and a representation
        of the created Individual MBS User Data Ingest Session resource is returned.
      content:
        application/json:
          schema:
            $ref:
'TS29580_Nmbssf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngSession'
    headers:
      Location:
        description: >
          Contains the URI of the newly created resource, according to the structure
          {apiRoot}/3gpp-mbs-ud-ingest/v1/sessions/{sessionId}
        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'

/sessions/{sessionId}:
  parameters:
    - name: sessionId
      in: path
      description: Identifier of the Individual MBS User Data Ingest Session resource.
      required: true
      schema:
        type: string

get:
  summary: Retrieve an existing Individual MBS User Data Ingest Session resource.
  tags:
    - Individual MBS User Data Ingest Session (Document)

```

```

operationId: RetrieveIndivMBSUserDataIngestSession
responses:
  '200':
    description: >
      OK. The requested Individual MBS User Data Ingest Session resource is successfully
      returned.
    content:
      application/json:
        schema:
          $ref:
'TS29580_Nmbf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngSession'
  '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: Request the update of an existing Individual MBS User Data Ingest Session resource.
  tags:
    - Individual MBS User Data Ingest Session (Document)
  operationId: UpdateIndivMBSUserDataIngestSession
  requestBody:
    description: >
      Contains the updated representation of the Individual MBS User Data Ingest Session
      resource.
    required: true
    content:
      application/json:
        schema:
          $ref:
'TS29580_Nmbf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngSession'
  responses:
    '200':
      description: >
        OK. The concerned Individual MBS User Data Ingest Session resource is successfully
        updated and a representation of the updated resource is returned.
      content:
        application/json:
          schema:
            $ref:
'TS29580_Nmbf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngSession'
    '204':
      description: >
        No Content. The concerned Individual MBS User Data Ingest Session resource is
        successfully updated.
    '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: Request the modification of an existing Individual MBS User Data Ingest Session
    resource.
    tags:
      - Individual MBS User Data Ingest Session (Document)
    operationId: ModifyIndivMBSUserDataIngestSession
    requestBody:
      description: >
        Contains the parameters to request the modification of the Individual MBS User Data Ingest
        Session resource.
      required: true
      content:
        application/merge-patch+json:
          schema:
            $ref:
' TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngSessionPatch'
    responses:
      '200':
        description: >
          OK. The concerned Individual MBS User Data Ingest Session resource is successfully
          modified and a representation of the updated resource is returned.
        content:
          application/json:
            schema:
              $ref:
' TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngSession'
      '204':
        description: >
          No Content. The concerned Individual MBS User Data Ingest Session resource is
          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 existing Individual MBS User Data Ingest Session resource.
    tags:
      - Individual MBS User Data Ingest Session (Document)
    operationId: DeleteIndivMBSUserDataIngestSession
    responses:
      '204':
        description: >
          No Content. The Individual MBS User Data Ingest Session resource is successfully

```

```

    deleted.
  '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'

/status-subscriptions:
  get:
    summary: Retrieve all the active MBS User Data Ingest Session Status Subscriptions resources
    managed by the NEF.
    tags:
      - MBS User Data Ingest Session Status Subscriptions (Collection)
    operationId: RetrieveMBSUserDataIngStatSubscs
    responses:
      '200':
        description: >
          OK. All the active MBS User Data Ingest Session Status Subscriptions managed by the NEF
          are returned.
        content:
          application/json:
            schema:
              type: array
              items:
                $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubsc'
            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 Individual MBS User Data Ingest Session Status Subscription resource.
    tags:
      - MBS User Data Ingest Session Status Subscriptions (Collection)
    operationId: CreateMBSUserDataIngStatSubsc
    requestBody:
      description: >
        Contains the parameters to request the creation of a new MBS User Data Ingest Session
        Status Subscription resource.
      required: true
      content:
        application/json:

```

```

    schema:
      $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubsc'
  responses:
    '201':
      description: >
        Created. Successful creation of a new Individual MBS User Data Ingest Session
        Status Subscription resource.
      content:
        application/json:
          schema:
            $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubsc'
  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:
    mbsUserDataIngestSessionStatusNotif:
      '{request.body#/notifUri}':
        post:
          requestBody:
            required: true
            content:
              application/json:
                schema:
                  $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatNotif'
  responses:
    '204':
      description: No Content. Successful reception of the 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'

```

```

/status-subscriptions/{subscriptionId}:
  parameters:
    - name: subscriptionId
      in: path
      description: >
        Identifier of the Individual MBS User Data Ingest Session Status Subscription resource.
      required: true
      schema:
        type: string

  get:
    summary: Retrieve an existing Individual MBS User Data Ingest Session Status Subscription
resource.
    tags:
      - Individual MBS User Data Ingest Session Status Subscription (Document)
    operationId: RetrieveIndMBSUserDataIngStatSubsc
    responses:
      '200':
        description: >
          OK. Successful retrieval of the requested Individual MBS User Data Ingest Session
          Status Subscription resource.
        content:
          application/json:
            schema:
              $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubsc'
      '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: Request the update of an existing Individual MBS User Data Ingest Session Status
Subscription resource.
    tags:
      - Individual MBS User Data Ingest Session Status Subscription (Document)
    operationId: UpdateIndMBSUserDataIngStatSubsc
    requestBody:
      description: >
        Contains the updated representation of the Individual MBS User Data Ingest Session Status
        Subscription resource.
      required: true
      content:
        application/json:
          schema:
            $ref:
'TS29580_Nmbsf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubsc'
    responses:
      '200':
        description: >
          OK. The concerned Individual MBS User Data Ingest Session Status Subscription resource
          is successfully updated and a representation of the updated resource is returned in the
          response body.
        content:
          application/json:

```



```

    schema:
      $ref:
'TS29580_Nmbssf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubsc'
  '204':
    description: >
      No Content. The concerned Individual MBS User Data Ingest Session Status Subscription
      resource is successfully updated and no content is returned in the response 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'

  patch:
    summary: Request the modification of an existing Individual MBS User Data Ingest Session
    Status Subscription resource.
    tags:
      - Individual MBS User Data Ingest Session Status Subscription (Document)
    operationId: ModifyIndMBSUserDataIngStatSubsc
    requestBody:
      description: >
        Contains the parameters to request the modification of the Individual MBS User Data Ingest
        Session Status Subscription resource.
      required: true
      content:
        application/merge-patch+json:
          schema:
            $ref:
'TS29580_Nmbssf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubscPatch'
    responses:
  '200':
    description: >
      OK. The concerned Individual MBS User Data Ingest Session Status Subscription resource
      is successfully modified and a representation of the updated resource is returned in the
      response body.
    content:
      application/json:
        schema:
          $ref:
'TS29580_Nmbssf_MBSUserDataIngestSession.yaml#/components/schemas/MBSUserDataIngStatSubsc'
  '204':
    description: >
      No Content. The concerned Individual MBS User Data Ingest Session Status Subscription
      resource is successfully modified and no content is returned in the response 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'

delete:
  summary: Deletes an existing Individual MBS User Data Ingest Session Status Subscription
  resource.
  tags:
    - Individual MBS User Data Ingest Session Status Subscription (Document)
  operationId: DeleteIndMBSUserDataIngStatSubsc
  responses:
    '204':
      description: >
        No Content. Successful deletion of the existing Individual MBS User Data Ingest Session
        Status Subscription 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: {}

#
# STRUCTURED DATA TYPES
#
#
# SIMPLE DATA TYPES
#
#
# ENUMERATIONS
#

```

A.26 MSEventExposure API

openapi: 3.0.0

```

info:
  title: 3gpp-ms-event-exposure
  version: 1.0.1
  description: |
    API for Media Streaming Event Exposure.

```

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```

externalDocs:
  description: >
    3GPP TS 29.522 V17.8.0; 5G System; Network Exposure Function Northbound APIs.
  url: 'https://www.3gpp.org/ftp/Specs/archive/29_series/29.522/'

servers:
- url: '{apiRoot}/3gpp-ms-event-exposure/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122

security:
- {}
- oAuth2ClientCredentials: []

paths:
  /subscriptions:
    get:
      summary: Retrieve all the active Media Streaming Event Exposure Subscription resources managed
      by the NEF.
      tags:
      - Media Streaming Event Exposure Subscriptions (Collection)
      operationId: RetrieveMSEventExposureSubscs
      responses:
        '200':
          description: >
            OK. All the active Media Streaming Event Exposure Subscriptions managed by the NEF are
            returned.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: 'TS29517_Naf_EventExposure.yaml#/components/schemas/AfEventExposureSubsc'
                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: Request the creation of a new Individual Media Streaming Event Exposure Subscription
      resource.
      tags:
      - Media Streaming Event Exposure Subscriptions (Collection)
      operationId: CreateMSEventExposureSubsc
      requestBody:
        description: >
          Contains the parameters to request the creation of a new Media Streaming Event Exposure
          Subscriptionat the NEF.
        required: true
        content:
          application/json:
            schema:
              $ref: 'TS29517_Naf_EventExposure.yaml#/components/schemas/AfEventExposureSubsc'
      responses:

```

```

'201':
  description: >
    Created. Successful creation of a new Individual Media Streaming Event Exposure
    Subscription resource.
  content:
    application/json:
      schema:
        $ref: 'TS29517_Naf_EventExposure.yaml#/components/schemas/AfEventExposureSubsc'
  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:
  msEventExposureNotif:
    '{request.body#/notifUri}':
      post:
        requestBody:
          required: true
          content:
            application/json:
              schema:
                $ref:
'TS29517_Naf_EventExposure.yaml#/components/schemas/AfEventExposureNotif'
      responses:
        '204':
          description: No Content. Successful reception of the 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'

```

```

/subscriptions/{subscriptionId}:
  parameters:
    - name: subscriptionId
      in: path
      description: Identifier of the Individual Media Streaming Event Exposure Subscription
resource.
  required: true
  schema:
    type: string

get:
  summary: Retrieve an existing Individual Media Streaming Event Exposure Subscription resource.
  tags:
    - Individual Media Streaming Event Exposure Subscription (Document)
  operationId: RetrieveIndivMSEventExposureSubsc
  responses:
    '200':
      description: >
        OK. The requested Individual Media Streaming Event Exposure Subscription resource is
        successfully returned.
      content:
        application/json:
          schema:
            $ref: 'TS29517_Naf_EventExposure.yaml#/components/schemas/AfEventExposureSubsc'
    '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: Request the update of an existing Individual Media Streaming Event Exposure
Subscription resource.
  tags:
    - Individual Media Streaming Event Exposure Subscription (Document)
  operationId: UpdateIndivMSEventExposureSubsc
  requestBody:
    description: >
      Contains the updated representation of the Individual Media Streaming Event Exposure
      Subscription resource.
      resource.
    required: true
    content:
      application/json:
        schema:
          $ref: 'TS29517_Naf_EventExposure.yaml#/components/schemas/AfEventExposureSubsc'
  responses:
    '200':
      description: >
        OK. The concerned Individual Media Streaming Event Exposure Subscription resource is
        successfully updated and a representation of the updated resource is returned in the
        response body.
      content:
        application/json:
          schema:
            $ref: 'TS29517_Naf_EventExposure.yaml#/components/schemas/AfEventExposureSubsc'
    '204':
      description: >
        No Content. The concerned Individual Media Streaming Event Exposure Subscription
        resource was successfully updated and no content is returned in the response 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'
```

delete:

summary: Request the deletion of an existing Individual Media Streaming Event Exposure Subscription resource.

tags:

- Individual Media Streaming Event Exposure Subscription (Document)

operationId: DeleteIndivMSEventExposureSubsc

responses:

```
  '204':
    description: >
      No Content. The Individual Media Streaming Event Exposure Subscription resource is
      successfully deleted.
  '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: {}

#

STRUCTURED DATA TYPES

#

SIMPLE DATA TYPES

#

#

ENUMERATIONS

#

Annex B (informative): Change history

| Change history | | | | | | | |
|----------------|---------|-----------|------|-----|-----|--|-------------|
| Date | Meeting | TDoc | CR | Rev | Cat | Subject/Comment | New version |
| 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 |

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| 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 |
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| 2019-09 | CT#85 | CP-192138 | 0082 | 2 | B | AF acknowledgement of UP path event notification | 16.1.0 |
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| 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 |
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| 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 |
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| 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 |
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| 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 |
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| 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 |
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| 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 |
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| 2020-03 | CT#87e | CP-200203 | 0136 | | F | Definition of lptvConfigData | 16.3.0 |
| 2020-03 | CT#87e | CP-200219 | 0137 | | F | Usage of the "bdtRefld" property | 16.3.0 |
| 2020-03 | CT#87e | CP-200215 | 0138 | | F | Miscellaneous errors | 16.3.0 |
| 2020-03 | CT#87e | CP-200259 | 0140 | 3 | 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 |

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| 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 |
| 2020-06 | CT#88e | CP-201252 | 0170 | 3 | F | Clarify nullable attributes used in PATCH | 16.4.0 |
| 2020-06 | CT#88e | CP-201244 | 0171 | 1 | F | Storage of YAML files in ETSI Forge | 16.4.0 |
| 2020-06 | CT#88e | CP-201178 | 0172 | 2 | F | Confidence of analytics results for Nnef_AnalyticsExposure service | 16.4.0 |
| 2020-06 | CT#88e | CP-201238 | 0173 | | B | Complete ServiceParameter API | 16.4.0 |
| 2020-06 | CT#88e | CP-201276 | 0174 | 1 | F | Traffic descriptor for xBDT | 16.4.0 |
| 2020-06 | CT#88e | CP-201213 | 0175 | 1 | F | Corrections related to URLLC | 16.4.0 |
| 2020-06 | CT#88e | CP-201228 | 0177 | | F | Clarify unmodifiable attribute in PUT | 16.4.0 |
| 2020-06 | CT#88e | CP-201234 | 0178 | 1 | F | Optional target UE | 16.4.0 |
| 2020-06 | CT#88e | CP-201246 | 0179 | 1 | F | Move 5G specific procedure to TS 29.522 | 16.4.0 |
| 2020-06 | CT#88e | CP-201210 | 0180 | 1 | F | Interaction with UDM for Enhanced Coverage Restriction Control | 16.4.0 |
| 2020-06 | CT#88e | CP-201210 | 0181 | 1 | B | Support of Enhanced Coverage Mode control | 16.4.0 |
| 2020-06 | CT#88e | CP-201234 | 0182 | | F | Support of immediate reporting for Nnef_AnalyticsExposure service | 16.4.0 |
| 2020-06 | CT#88e | CP-201246 | 0183 | 1 | F | Corrections to apiVersion | 16.4.0 |
| 2020-06 | CT#88e | CP-201246 | 0184 | 1 | F | Corrections to error status code | 16.4.0 |
| 2020-06 | CT#88e | CP-201274 | 0185 | 1 | B | AF provides AAA server address | 16.4.0 |
| 2020-06 | CT#88e | CP-201246 | 0186 | 1 | F | Updates to IP address | 16.4.0 |
| 2020-06 | CT#88e | CP-201234 | 0187 | 2 | F | Update to reporting information | 16.4.0 |
| 2020-06 | CT#88e | CP-201234 | 0188 | 1 | F | Ratio of analytics results for Nnef_AnalyticsExposure service | 16.4.0 |
| 2020-06 | CT#88e | CP-201234 | 0189 | | F | Supported features definition for Nnef_AnalyticsExposure service | 16.4.0 |
| 2020-06 | CT#88e | CP-201234 | 0190 | 1 | F | Corrections on target UE information for Nnef_AnalyticsExposure service | 16.4.0 |
| 2020-06 | CT#88e | CP-201246 | 0191 | 1 | F | Corrections on tags field for NEF Northbound APIs | 16.4.0 |
| 2020-06 | CT#88e | CP-201234 | 0192 | 1 | F | Support of network performance for Nnef_AnalyticsExposure service | 16.4.0 |
| 2020-06 | CT#88e | CP-201234 | 0193 | 1 | F | Data type used in fetch the analytics | 16.4.0 |
| 2020-06 | CT#88e | CP-201235 | 0194 | 1 | F | Supported headers, Resource Data type and Operation Name | 16.4.0 |
| 2020-06 | CT#88e | CP-201255 | 0195 | | F | Update of OpenAPI version and TS version in externalDocs field | 16.4.0 |
| 2020-06 | CT#88e | CP-201336 | 0196 | 1 | F | Remove the Abnormal_Behaviour applicability for ueMobilityInfos in AnalyticsData | 16.4.0 |
| 2020-09 | CT#89e | CP-202077 | 0199 | | F | Remove 5G procedures from TS 29.122 | 16.5.0 |
| 2020-09 | CT#89e | CP-202048 | 0200 | | F | Corrections on NiddConfigurationTrigger API | 16.5.0 |
| 2020-09 | CT#89e | CP-202048 | 0201 | | F | Support PDU session status | 16.5.0 |
| 2020-09 | CT#89e | CP-202059 | 0202 | | F | Missed Location header table | 16.5.0 |
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| 2020-09 | CT#89e | CP-202059 | 0206 | | F | URI of ACSPParameterProvision API | 16.5.0 |
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| 2020-09 | CT#89e | CP-202066 | 0209 | | F | Validity period for analytics information | 16.5.0 |
| 2020-09 | CT#89e | CP-202081 | 0210 | | F | 5G LAN Parameter Provisioning | 16.5.0 |
| 2020-09 | CT#89e | CP-202066 | 0211 | | F | Omitted event reporting information | 16.5.0 |
| 2020-09 | CT#89e | CP-202082 | 0212 | 1 | F | Reading all subscriptions in ApplyingBdtPolicy API | 16.5.0 |
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| 2020-09 | CT#89e | CP-202066 | 0214 | 1 | F | Ratio and confidence for UE mobility | 16.5.0 |
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| 2020-09 | CT#89e | CP-202066 | 0217 | | F | Applicabilities of snssai, dnn and locArea | 16.5.0 |
| 2020-09 | CT#89e | CP-202084 | 0218 | | F | Update of OpenAPI version and TS version in externalDocs field | 16.5.0 |
| 2020-12 | CT#90e | CP-203139 | 0219 | 1 | F | Essential Corrections and alignments | 16.6.0 |
| 2020-12 | CT#90e | CP-203109 | 0220 | 1 | F | Essential corrections and alignments | 16.6.0 |
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| 2020-12 | CT#90e | CP-203139 | 0222 | | F | Storage of YAML files in 3GPP Forge | 16.6.0 |
| 2020-12 | CT#90e | CP-203111 | 0223 | | F | array QosMonitoringReport | 16.6.0 |
| 2020-12 | CT#90e | CP-203139 | 0224 | 1 | F | Callback URI correction | 16.6.0 |
| 2020-12 | CT#90e | CP-203108 | 0227 | | F | Difference between 4G and 5G for ECRControl API | 16.6.0 |
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| 2020-12 | CT#90e | CP-203118 | 0231 | 1 | A | Solve IP address overlapping for AF traffic influence | 16.6.0 |
| 2020-12 | CT#90e | CP-203129 | 0232 | 1 | F | Corrections to Subscription Request in AnalyticsExposure API | 16.6.0 |
| 2020-12 | CT#90e | CP-203129 | 0233 | 1 | F | Correction to appld exposed in AnalyticsExposure API | 16.6.0 |
| 2020-12 | CT#90e | CP-203152 | 0236 | | F | Update of OpenAPI version and TS version in externalDocs field | 16.6.0 |
| 2020-12 | CT#90e | CP-203124 | 0225 | 1 | B | Procedures of Nnef_AKMA service | 17.0.0 |
| 2020-12 | CT#90e | CP-203124 | 0226 | 1 | B | API definition of Nnef_AKMA service | 17.0.0 |
| 2020-12 | CT#90e | CP-203130 | 0234 | 1 | F | Corrections to location area usage | 17.0.0 |
| 2021-03 | CT#91e | CP-210202 | 0238 | | A | Correct presence condition in ACS provisioning procedure | 17.1.0 |
| 2021-03 | CT#91e | CP-210210 | 0240 | 1 | A | Correct AlternativeQoS_5G description | 17.1.0 |
| 2021-03 | CT#91e | CP-210210 | 0242 | 1 | A | Correct service parameter provisioning procedure | 17.1.0 |
| 2021-03 | CT#91e | CP-210210 | 0244 | 1 | A | Correction to alternative QoS paramter report | 17.1.0 |
| 2021-03 | CT#91e | CP-210210 | 0246 | 2 | A | Disable UE notifications at changes related to Alternative QoS Profiles | 17.1.0 |
| 2021-03 | CT#91e | CP-210192 | 0248 | 1 | A | QoS monitoring report during the PDU session termination | 17.1.0 |
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| 2021-03 | CT#91e | CP-210203 | 0251 | 2 | B | Support Redirection for AKMA API | 17.1.0 |
| 2021-03 | CT#91e | CP-210203 | 0252 | | F | Missed 204 No Content for AKMA API | 17.1.0 |
| 2021-03 | CT#91e | CP-210207 | 0254 | 1 | A | Last known location report | 17.1.0 |
| 2021-03 | CT#91e | CP-210226 | 0255 | 1 | F | API design style | 17.1.0 |
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| 2021-03 | CT#91e | CP-210208 | 0259 | 3 | A | Support Redirection for TrafficInfluence API | 17.1.0 |
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| 2021-03 | CT#91e | CP-210218 | 0262 | | F | Adding "description" field for map data types | 17.1.0 |
| 2021-03 | CT#91e | CP-210219 | 0263 | 1 | F | OpenAPI reference | 17.1.0 |
| 2021-03 | CT#91e | CP-210237 | 0265 | 1 | A | Correction to mtcProviderId in 5GLANParameterProvision API | 17.1.0 |
| 2021-03 | CT#91e | CP-210190 | 0267 | 1 | A | Correction to mtcProviderId in LpiParameterProvision API | 17.1.0 |
| 2021-03 | CT#91e | CP-210203 | 0268 | 1 | F | Correction to AfId in AKMA API | 17.1.0 |
| 2021-03 | CT#91e | CP-210203 | 0269 | 1 | F | Correction to AKId in AKMA API | 17.1.0 |
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| 2021-03 | CT#91e | CP-210206 | 0277 | 1 | A | Failure events for AnalyticsExposure API | 17.1.0 |
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| 2021-03 | CT#91e | CP-210208 | 0280 | 1 | A | Support Redirection for 5GLANParameterProvision API | 17.1.0 |
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| 2021-03 | CT#91e | CP-210209 | 0284 | 1 | A | Support Redirection for AnalyticsExposure API | 17.1.0 |
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| 2021-03 | CT#91e | CP-210199 | 0299 | | A | Correction on N5 events for AsSessionWithQoS API | 17.1.0 |
| 2021-03 | CT#91e | CP-210202 | 0302 | 2 | A | Correction to mtcProviderId in IPTVConfiguration API | 17.1.0 |
| 2021-03 | CT#91e | CP-210210 | 0304 | 1 | A | Correction to mtcProviderId in ServiceParameter API | 17.1.0 |
| 2021-03 | CT#91e | CP-210202 | 0306 | 2 | A | Correction to mtcProviderId in ACSParameterProvision API | 17.1.0 |
| 2021-03 | CT#91e | CP-210240 | 0308 | | F | Update of OpenAPI version and TS version in externalDocs field | 17.1.0 |
| 2021-06 | CT#92e | CP-211282 | 0270 | 5 | B | Update DNN and S-NSSAI in ChargeableParty procedure | 17.2.0 |
| 2021-06 | CT#92e | CP-211282 | 0271 | 5 | B | Update DNN and S-NSSAI in AsSessionWithQoS API procedure | 17.2.0 |
| 2021-06 | CT#92e | CP-211256 | 0310 | 2 | D | Correction of AaaUsage | 17.2.0 |
| 2021-06 | CT#92e | CP-211245 | 0312 | 2 | D | Correction of AccessRightStatus | 17.2.0 |
| 2021-06 | CT#92e | CP-211238 | 0314 | 1 | F | Adding some missing description fields to data type definitions in OpenAPI specification files of the TrafficInfluence API | 17.2.0 |
| 2021-06 | CT#92e | CP-211238 | 0315 | 1 | F | Adding some missing description fields to data type definitions in OpenAPI specification files of the NiddConfigurationTrigger API | 17.2.0 |
| 2021-06 | CT#92e | CP-211238 | 0316 | 1 | F | Adding some missing description fields to data type definitions in OpenAPI specification files of the AnalyticsExposure API | 17.2.0 |
| 2021-06 | CT#92e | CP-211239 | 0317 | 1 | F | Adding some missing description fields to data type definitions in OpenAPI specification files of the 5GLANParameterProvision API | 17.2.0 |
| 2021-06 | CT#92e | CP-211239 | 0318 | 1 | F | Adding some missing description fields to data type definitions in OpenAPI specification files of the ApplyingBdtPolicy API | 17.2.0 |
| 2021-06 | CT#92e | CP-211239 | 0319 | 1 | F | Adding some missing description fields to data type definitions in OpenAPI specification files of the IPTVConfiguration API | 17.2.0 |
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| 2021-06 | CT#92e | CP-211239 | 0321 | 1 | F | Adding some missing description fields to data type definitions in OpenAPI specification files of the ServiceParameter API | 17.2.0 |
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| 2021-06 | CT#92e | CP-211239 | 0323 | 1 | F | Adding some missing description fields to data type definitions in OpenAPI specification files of the MoLcsNotify API | 17.2.0 |
| 2021-06 | CT#92e | CP-211239 | 0324 | 1 | F | Adding some missing description fields to data type definitions in OpenAPI specification files of the AKMA API | 17.2.0 |
| 2021-06 | CT#92e | CP-211201 | 0325 | 3 | B | 5G ProSe related updates to the Nnef_ServiceParameter Service | 17.2.0 |

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| 2021-06 | CT#92e | CP-211214 | 0330 | | F | Correction of TS title for 29.535 in references | 17.2.0 |
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| 2021-06 | CT#92e | CP-211218 | 0332 | | B | API definition for ECS address provisioning | 17.2.0 |
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| 2021-12 | CT#94e | CP-213194 | 0417 | 1 | B | Update procedures for AF triggered AM Influence | 17.4.0 |
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| 2021-12 | CT#94e | CP-213212 | 0428 | 1 | F | Resolve editor note for Multiple QoS Class | 17.4.0 |
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| 2022-06 | CT#96 | CP-221125 | 0512 | 2 | B | Procedures for AF specific UE ID retrieval | 17.6.0 |
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| 2022-06 | CT#96 | CP-221125 | 0514 | 3 | B | OpenAPI file to support Nnef_UEId service | 17.6.0 |
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| 2022-06 | CT#96 | CP-221125 | 0528 | 2 | B | Support AF specific UE ID retrieval procedures in CpProvisioning API | 17.6.0 |
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| 2022-06 | CT#96 | CP-221134 | 0552 | 4 | B | Support Observed Service Experience Analytics in AnalyticsExposure API | 17.6.0 |
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| 2022-06 | CT#96 | CP-221120 | 0557 | | B | MBS session Status Notify update with ingress tunnel address. | 17.6.0 |
| 2022-06 | CT#96 | CP-221120 | 0558 | | B | MBS session Status Notify update with delivery status indication for broadcast session. | 17.6.0 |
| 2022-06 | CT#96 | CP-221122 | 0559 | 1 | F | AKID encoding clarification | 17.6.0 |
| 2022-06 | CT#96 | CP-221122 | 0560 | 1 | F | Afld related EN resolution. | 17.6.0 |
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| 2022-06 | CT#96 | CP-221147 | 0566 | 1 | F | Adding a missing reference number | 17.6.0 |
| 2022-06 | CT#96 | CP-221145 | 0568 | 3 | F | Correction to state of configuration | 17.6.0 |
| 2022-06 | CT#96 | CP-221144 | 0569 | | F | Correction to the Nnef_TimeSynchronization service operation description | 17.6.0 |
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| 2022-06 | CT#96 | CP-221144 | 0571 | 1 | F | Correction to the TSCTSF discovery of subscription to notification of Time Synchronization Capabilities | 17.6.0 |
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| 2022-06 | CT#96 | CP-221126 | 0581 | 1 | F | Correction to subscription to notification of outcome of UE Policies delivery | 17.6.0 |
| 2022-06 | CT#96 | CP-221126 | 0582 | 3 | F | Remove the editor's note related to AfNotification data type | 17.6.0 |
| 2022-06 | CT#96 | CP-221147 | 0583 | | F | Correct IE name in service parameter provisioning | 17.6.0 |
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| 2022-06 | CT#96 | CP-221129 | 0586 | | B | Support of requesting and reporting the list of top applications | 17.6.0 |
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| 2022-06 | CT#96 | CP-221147 | 0600 | | B | Update re-used data types for TrafficInfluence API | 17.6.0 |
| 2022-06 | CT#96 | CP-221136 | 0601 | 1 | B | Adding support for requesting analytics within a specified time | 17.6.0 |
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| 2022-06 | CT#96 | CP-221147 | 0621 | 1 | F | Update the definition of notifUri for TrafficInfluence API | 17.6.0 |
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| 2022-06 | CT#96 | CP-221157 | 0630 | 1 | F | Support the update of notifUri for AnalyticsExposure API | 17.6.0 |
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| 2022-09 | CT#97e | CP-222110 | 0637 | 1 | B | Updates to Data Reporting Provisioning API | 17.7.0 |
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| 2022-09 | CT#97e | CP-222098 | 0639 | 1 | F | Resolve EN for AF specific UE Id retrieval in CpProvisioning API | 17.7.0 |
| 2022-09 | CT#97e | CP-222098 | 0640 | 1 | F | Resolve EN for AF specific UE Id retrieval in NpConfiguraton API | 17.7.0 |
| 2022-09 | CT#97e | CP-222110 | 0641 | | F | Correction of Data reporting API Redirection handling | 17.7.0 |
| 2022-09 | CT#97e | CP-222103 | 0642 | 1 | F | Adding missing attributes to AnalyticsData | 17.7.0 |
| 2022-09 | CT#97e | CP-222104 | 0643 | 2 | F | Applicability update for AnalyticsEventFilter | 17.7.0 |
| 2022-09 | CT#97e | CP-222103 | 0644 | 1 | F | Applicability correction for AnalyticsEventFilterSubsc | 17.7.0 |
| 2022-09 | CT#97e | CP-222103 | 0645 | 1 | F | Visited Areas addition for AnalyticsEventFilterSubsc & AnalyticsEventFilter | 17.7.0 |
| 2022-09 | CT#97e | CP-222103 | 0646 | 1 | F | Matching Direction addition for AnalyticsEventFilterSubsc | 17.7.0 |
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| 2022-09 | CT#97e | CP-222110 | 0649 | | F | Correction for service name of DataReportingProvisioning API | 17.7.0 |
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| 2022-09 | CT#97e | CP-222110 | 0659 | 1 | B | API resource clauses in Nnef_MSEventExposure API | 17.7.0 |
| 2022-09 | CT#97e | CP-222110 | 0660 | 1 | B | API notification clauses in Nnef_MSEventExposure API | 17.7.0 |
| 2022-09 | CT#97e | CP-222110 | 0661 | 1 | B | API data model in Nnef_MSEventExposure API | 17.7.0 |
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| 2022-09 | CT#97e | CP-222127 | 0677 | | F | Misalignment of data type definition in AMPolicyAuthorization API | 17.7.0 |
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| 2022-09 | CT#97e | CP-222127 | 0686 | 1 | F | Missing description field for enumeration data types | 17.7.0 |
| 2022-09 | CT#97e | CP-222125 | 0689 | 1 | F | Applicable accuracy value | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0690 | | B | Define API general clauses in Nnef_MBSUserDataIngestSession API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0691 | 1 | B | Define API resource clauses in Nnef_MBSUserDataIngestSession API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0692 | | B | Define API notification clauses in Nnef_MBSUserDataIngestSession API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0693 | 1 | B | Define API data model in Nnef_MBSUserDataIngestSession API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0694 | 1 | B | Define Service and Service Operations in Nnef_MBSUserDataIngestSession API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0695 | 1 | B | Define OpenAPI file of Nnef_MBSUserDataIngestSession API | 17.7.0 |
| 2022-09 | CT#97e | CP-222099 | 0696 | 1 | F | Corrections to URSP rule in ServiceParameter API | 17.7.0 |
| 2022-09 | CT#97e | CP-222118 | 0697 | 1 | F | Missing description field for enumeration data type in IPTVConfiguration API | 17.7.0 |
| 2022-09 | CT#97e | CP-222118 | 0698 | 1 | F | Missing description field for enumeration data type in TrafficInfluence API | 17.7.0 |

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| 2022-09 | CT#97e | CP-222094 | 0699 | 1 | B | Adding the support of MBS Service Requirements for the Nnef_MBSSession API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0700 | 1 | B | Completing the definition of the Nnef_MBSSession API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0701 | 1 | F | Miscellaneous corrections to the Nnef_MBSSession API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0702 | | F | Miscellaneous corrections to the Nnef_MBSTMGI API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0703 | | B | Updating the service description clauses to support MBS Session Authorization provisioning | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0704 | | B | Updating the resources clause to support MBS Session Authorization provisioning | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0705 | | B | Updating the data model clauses to support MBS Session Authorization provisioning | 17.7.0 |
| 2022-09 | CT#97e | CP-222207 | 0706 | 1 | B | Updating the OpenAPI description to support MBS Session Authorization provisioning | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0707 | | B | Defining the service description clauses of the Nnef_MBSUserService API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0708 | | B | Defining the API general clauses of the Nnef_MBSUserService API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0709 | | B | Defining the API resources clause of the Nnef_MBSUserService API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0710 | | B | Defining the API notifications clause of the Nnef_MBSUserService API | 17.7.0 |
| 2022-09 | CT#97e | CP-222094 | 0711 | | B | Defining the API data model clause of the Nnef_MBSUserService API | 17.7.0 |
| 2022-09 | CT#97e | CP-222095 | 0712 | 1 | B | Defining the OpenAPI description of the Nnef_MBSUserService API | 17.7.0 |
| 2022-09 | CT#97e | CP-222098 | 0714 | 1 | F | Essential corrections to the application errors defined for the Nnef_UEId API | 17.7.0 |
| 2022-09 | CT#97e | CP-222098 | 0715 | 1 | F | Corrections to user consent management for the Nnef_EventExposure API | 17.7.0 |
| 2022-09 | CT#97e | CP-222097 | 0716 | | F | Essential corrections to the application errors defined for AF specific UE ID retrieval via the CpProvisioning API | 17.7.0 |
| 2022-09 | CT#97e | CP-222097 | 0717 | | F | Essential corrections to the application errors defined for AF specific UE ID retrieval via the MonitoringEvent API | 17.7.0 |
| 2022-09 | CT#97e | CP-222097 | 0718 | | F | Essential corrections to the application errors defined for AF specific UE ID retrieval via the NpConfiguration API | 17.7.0 |
| 2022-09 | CT#97e | CP-222111 | 0720 | 1 | F | Miscellaneous corrections to the definition of the DataReporting API | 17.7.0 |
| 2022-09 | CT#97e | CP-222111 | 0721 | 1 | F | Miscellaneous corrections to the definition of the DataReportingProvisioning API | 17.7.0 |
| 2022-09 | CT#97e | CP-222117 | 0722 | | F | Error handling clause alignment with other NBI and 5GS APIs | 17.7.0 |
| 2022-09 | CT#97e | CP-222118 | 0724 | 1 | F | Application errors handling for the AnalyticsExposure API | 17.7.0 |
| 2022-09 | CT#97e | CP-222114 | 0725 | 1 | F | Operation identifiers for TimeSyncExposure API and ASTI API | 17.7.0 |
| 2022-09 | CT#97e | CP-222096 | 0726 | | F | Operation identifiers for AKMA API | 17.7.0 |
| 2022-09 | CT#97e | CP-222097 | 0727 | | F | Operation identifiers for UEId API | 17.7.0 |
| 2022-09 | CT#97e | CP-222099 | 0728 | 1 | F | Operation identifiers for EcsAddressProvision API and EASDeployment API | 17.7.0 |
| 2022-09 | CT#97e | CP-222118 | 0729 | 1 | F | Operation identifiers for NEF northbound APIs | 17.7.0 |
| 2022-09 | CT#97e | CP-222102 | 0730 | | F | Add restriction for exposing information to an untrusted AF | 17.7.0 |
| 2022-09 | CT#97e | CP-222121 | 0731 | | F | Update of info and externalDocs fields | 17.7.0 |
| 2022-12 | CT#98e | CP-223161 | 0734 | 1 | A | Correction of the minimum items in the GET response of LpiParametersProvision | 17.8.0 |
| 2022-12 | CT#98e | CP-223172 | 0736 | | F | Analytics exposure restrictions | 17.8.0 |
| 2022-12 | CT#98e | CP-223181 | 0737 | 1 | F | Corrections of the TSCTSF usage determination in AF session with QoS | 17.8.0 |
| 2022-12 | CT#98e | CP-223175 | 0740 | | A | Corrections in ServiceParameter API | 17.8.0 |
| 2022-12 | CT#98e | CP-223184 | 0742 | 1 | F | Corrections in TimeSyncExposure API | 17.8.0 |
| 2022-12 | CT#98e | CP-223197 | 0743 | | F | Corrections in AMPolicyAuthorization API | 17.8.0 |
| 2022-12 | CT#98e | CP-223184 | 0745 | 1 | F | Corrections in procedure for NEF north bound interfaces | 17.8.0 |
| 2022-12 | CT#98e | CP-223167 | 0747 | 1 | F | Data type Cardinality corrections for GET response in MBSSession API | 17.8.0 |
| 2022-12 | CT#98e | CP-223166 | 0748 | | F | Data type Cardinality corrections for GET response in MBSUserDataIngestSession API | 17.8.0 |
| 2022-12 | CT#98e | CP-223166 | 0749 | | F | Data type Cardinality corrections for GET response in MBSUserService Service API | 17.8.0 |
| 2022-12 | CT#98e | CP-223179 | 0750 | | F | Data type Cardinality corrections for GET response in MSEventExposure API | 17.8.0 |
| 2022-12 | CT#98e | CP-223166 | 0751 | | F | Corrections on MBS FSA IDs for broadcast MBS session creation | 17.8.0 |
| 2022-12 | CT#98e | CP-223171 | 0753 | 1 | F | Correction to the EASDeployment API | 17.8.0 |
| 2022-12 | CT#98e | CP-223167 | 0754 | 1 | F | Updates to NEF Northbound APIs Overview and Introduction | 17.8.0 |
| 2022-12 | CT#98e | CP-223196 | 0757 | | F | Correction related to applicability of traffic correlation indicator | 17.8.0 |
| 2022-12 | CT#98e | CP-223172 | 0758 | | F | Corrections to data types in AnalyticsExposure API | 17.8.0 |
| 2022-12 | CT#98e | CP-223181 | 0759 | 1 | F | Corrections on Time Synchronization Capabilities subscription procedure | 17.8.0 |
| 2022-12 | CT#98e | CP-223168 | 0760 | 1 | F | Correction for AKMA Application Key Request | 17.8.0 |

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| 2022-12 | CT#98e | CP-223167 | 0761 | 1 | F | Corrections for MBSsession service | 17.8.0 |
| 2022-12 | CT#98e | CP-223173 | 0762 | 1 | F | Add clarifications for some information included in the analytics to the consumer | 17.8.0 |
| 2022-12 | CT#98e | CP-223197 | 0763 | 1 | F | Corrections for Nnef_AMPolicyAuthorization service | 17.8.0 |
| 2022-12 | CT#98e | CP-223240 | 0767 | | F | Update of info and externalDocs fields | 17.8.0 |
| 2023-03 | CT#99 | CP-230131 | 0771 | 1 | F | Adding MBS service area to the TmgiAllocRequest | 17.9.0 |
| 2023-03 | CT#99 | CP-230154 | 0772 | | F | Packet delay budget attribute name correction | 17.9.0 |
| 2023-03 | CT#99 | CP-230138 | 0790 | 1 | F | Resolve editor notes on user consent during AF specific UE ID retrieval | 17.9.0 |
| 2023-03 | CT#99 | CP-230145 | 0799 | | F | misspelled attribute anyUeInd | 17.9.0 |
| 2023-03 | CT#99 | CP-230140 | 0801 | | F | incorrect attribute name | 17.9.0 |
| 2023-03 | CT#99 | CP-230173 | 0812 | 1 | F | Correction on handling of Packet Delay Failure report Threshold | 17.9.0 |
| 2023-03 | CT#99 | CP-230154 | 0824 | 1 | F | Correction to TSCTSF invocation | 17.9.0 |
| 2023-03 | CT#99 | CP-230154 | 0829 | | F | Removal of the remaining ENs in the definition of the Nnef_TimeSyncExposure API | 17.9.0 |
| 2023-03 | CT#99 | CP-230145 | 0834 | 1 | F | Clarification for historical analytics exposure | 17.9.0 |
| 2023-03 | CT#99 | CP-230155 | 0839 | | F | Missing features for AsSessionWithQoS API | 17.9.0 |
| 2023-03 | CT#99 | CP-230154 | 0846 | 1 | F | Correction of the procedure when the NEF reject the AF update request | 17.9.0 |
| 2023-03 | CT#99 | CP-230160 | 0848 | | F | Update of info and externalDocs fields | 17.9.0 |
| 2023-06 | CT#100 | C3-232069 | 0915 | | F | Wrong attribute name in EAS deployment | 17.10.0 |
| 2023-06 | CT#100 | C3-232087 | 0919 | | A | Monitoring procedure corrections | 17.10.0 |
| 2023-06 | CT#100 | C3-232127 | 0929 | | F | Update MBS service area to the TmgiAllocRequest | 17.10.0 |
| 2023-06 | CT#100 | C3-232511 | 0951 | 1 | F | Reporting format for one-time reporting | 17.10.0 |

History

| Document history | | |
|-------------------------|----------------|-------------|
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